

Function Analysis Design Charrette Report

**FY01 MCON Project P-159A Bachelor Enlisted Quarters
Marine Corps Base, Camp Lejeune North Carolina**



**United States Navy, Atlantic Division
Naval Facilities Engineering Command**

06 – 10 December 1999

Design Team
Naval Facilities Engineering Command
Atlantic Division

Value Engineering Consultants
Lewis & Zimmerman Associates, Inc.



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P-159 Bachelor Enlisted Quarters,
Marine Corps Base, Camp Lejeune, North Carolina

<u>Approved by</u>	<u>Representing</u>	<u>Date</u>
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<i>John McPherson</i>	LANTDIV 4072	12/10/99
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**P-159 Bachelor Enlisted Quarters,
Marine Corps Base, Camp Lejeune, North Carolina**

Date

DEL. 10, 1999

12/10/99

12/10/99

SECTION 2 - EXECUTIVE SUMMARY

Introduction

A Design Charrette (DC) workshop was conducted for the MCON FY01 project P-159A Bachelor Enlisted Quarters, Marine Corps Base (MCB) Camp Lejeune, NC. The workshop was conducted 06 – 10 December 1999 in meeting rooms at the Comfort Inn, Jacksonville, NC. Participants included representatives from the following:

- MCBCL – Public Works Office
- MCBCL – 20 Reconnaissance Battalion
- LANTDIV Facilities Development Department
- LANTDIV Facilities Engineering Department
- LANTDIV Value Engineering and Project Management
- Lewis & Zimmerman Associates, Inc. (DC facilitator)

All of the participants are listed on the DC Participants worksheets in Section 4 of this report.

The goal of this DC workshop was to develop a project that could be constructed within budget and meet the users' functional needs. The basic DC approach uses function analysis techniques and the value engineering (VE) job plan to bring the owners and users into the design process and incorporate their needs into the concept designs which can progress to the 35% design stage or to a design/build package.

Kick-off Meeting

The kick-off meeting included an introduction of all participants, an overview of the DC process, and an overview of the facility's functions. In this last part, representatives of activity, including Captain Anthony Millar, gave a summary of their functions and a statement of their expectations for the BEQ. The users' functional requirements are displayed in a Random Function Analysis worksheet in Section 4 of this report.

Design Evolution

Concept #1 presented on the first day of the charrette included a 3-story "X"-shaped building configuration near the waterfront at the west side of the project site. The four sleeping room wings included 100 - 2X0 modules, forming "spokes" with the one story core area at the center. The parking lot is located on the east side in front of the building, compatibly sited for the continued westward development of the site for the future mess hall. The site design provides for a minimum 80ft setback from the building to comply with force protection requirements. The total building footprint of Concept #1 was 9067 SM, which exceeded the DD1391 maximum allowed scope of 8500 SM. Concept #1 estimated construction cost was \$13,081,374.

The total DD1391 authorized budget for this project is \$15,140,000. Budgetary goals for this project were identified as follows:

Design to ECC (base bid - 90% of 96%FR/FA) \$11,625,000

Design to ECC (total – 96%FR/FA) \$12,917,000

Significant design modifications considered to develop Concept #2 were:

- Revised building configuration to a “v”-shape.
- Reduced building footprint to the authorized 8500SM scope.
- Reduced landscaping.
- Added exterior gear rinsing and drying areas and associated grit chambers.
- Relocated laundry facilities to the ends of the buildings, and reduced area to accommodate fewer washers and dryers.
- Structural design was revised from a shear wall design to a frame design to comply with force protection requirements for buildings 3 stories or higher.

As a result, Concept #2 ECC was reduced to \$12,160,374. Also during the Concept #2 presentation, a full-scale model of the 2X0 room module was presented to alleviate concerns of adequacy of secure interior storage. The room module layout required no revision as the project design evolved from Concept #1 to Concept #3.

Concept #3 was developed, largely based on addressing the following comments received during the presentation of Concept #2:

- Design of the central core area building was simplified in order to maximize the area of the recreation lounge area.
- Overall building configuration remained the same, however central core building is now connected to the sleeping room wings at all 3 levels. Concepts #1 and #2 had shown a detached, single story core building.
- Stormwater retention pond was redesigned to reduce cost and accommodate expansion to support construction of the future mess hall.
- Roof design modified from standing seam metal to asphalt shingles for compatibility with nearby BEQ's.

The total ECC did not change substantially between Concept #2 and Concept #3. Concept #3 ECC is \$12,100,374. After all markups such as contingency, SIOH, and PCAS are accounted for, this ECC translates to 90% of the FR/FA. This substantially exceeds the original goal of 96% FR/FA for the total ECC. No additive bid items were identified, in order to maintain full project scope.

Final Concept

The final concept is detailed in Section 3 of this report.

Final Presentation

The final presentation of the Conceptual Design was made on Friday 10 December 1999. The entire project was presented with all disciplines being discussed. Comments received at this meeting were responded to in writing by the DC team and are included in Section 1.

1. Component NAVY		FY 2001 MILITARY CONSTRUCTION PROGRAM		2. Date 6/30/99	
3. Installation and Location/UIC: M67001 MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA			4. Project Title BACHELOR ENLISTED QUARTERS (COURTHOUSE)		
5. Program Element 0206496M		6. Category Code 721.24	7. Project Number 159A	8. Project Cost 15,140	
9. COST ESTIMATES					
Item	U/M	Quantity	Unit Cost	Cost (\$000)	
BACHELOR ENLISTED QUARTERS	m2	8,500	-	11,850	
BUILDING	m2	8,500	1,378	(11,710)	
TECHNICAL OPERATING MANUALS	LS	-	-	(50)	
INFORMATION SYSTEMS	LS	-	-	(90)	
SUPPORTING FACILITIES	LS	-	-	1,750	
SPECIAL FOUNDATION FEATURES	LS	-	-	(200)	
ELECTRICAL UTILITIES	LS	-	-	(460)	
MECHANICAL UTILITIES	LS	-	-	(500)	
PAVING AND SITE IMPROVEMENTS	LS	-	-	(460)	
FORCE PROTECTION	LS	-	-	(130)	
SUBTOTAL	-	-	-	13,600	
Contingency (5.0%)	-	-	-	680	
TOTAL CONTRACT COST	-	-	-	14,280	
Supervision Inspection & Overhead (6.0%)	-	-	-	860	
TOTAL REQUEST	-	-	-	15,140	
EQUIPMENT FROM OTHER APPROPRIATIONS	-	-	(NON-ADD)	1,935	
10. Description of Proposed Construction					
<p>Multi-story reinforced concrete frame building with 200 "2x0" rooms with semi-private bathrooms and walk-in closets, CATV and telephone communications cabling, recreation and service areas, laundry, fire protection system, air-conditioning, utilities, technical operating manuals, exterior walkways, grade beams pile caps, pile foundations, interior and exterior masonry walls, asphalt shingle roofing, exterior equipment washdown area, outside vehicle/equipment staging area, flexible parking, force protection features, storm water detention pond, and paving and site improvements.</p> <p>Maximum utilization: 400 E1-E3; Intended Grade Mix: 246 E1-E3; 77 E4-E5; Total: 323.</p>					
11. Requirement: <u>1,893 PN</u> Adequate: <u>778 PN</u> Substandard: <u>0 PN</u>					
<p>PROJECT:</p> <p>Constructs a "2x0" bachelor enlisted quarters with 200 rooms for permanent party enlisted personnel at Courthouse Bay on MCB Camp Lejeune, NC. (Current mission)</p> <p>REQUIREMENT:</p>					
(Continued On DD 1391C)					

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<p>(...continued)</p> <p>Adequate and modern bachelor housing which meets quality of life standards for permanent party enlisted personnel at Courthouse Bay on MCB Camp Lejeune.</p> <p>CURRENT SITUATION:</p> <p>Because of Hurricane Fran damage in 1996, enlisted personnel from the Reconnaissance Battalion previously located on Onslow Beach lost their barracks and work spaces. The Reconnaissance Battalion's work spaces were relocated to Courthouse Bay, a subcamp within the greater MCB Camp Lejeune area. However, with a BEQ requirement of 1,893 persons and only adequate space for 778 Marines, Courthouse Bay was unable to accommodate the billeting requirements of the Recon Bn Marines. Consequently, the Recon Bn's enlisted Marines were relocated to inadequate barracks in the French Creek area 12 miles from their work areas at Courthouse Bay. Recon Bn Marines now live 4 Marines to a room in three buildings built in 1968 and 1970 as 3 man rooms. These buildings, which do not meet current DoD functional space or design criteria, also have inadequate ventilation, exhaust, communications wiring, and roofs. In addition to the excessive transportation costs, efficiency losses, and degraded quality of life experienced from billeting these troops in crowded facilities far from their unit location, the Recon Bn's presence in the French Creek barracks only further exacerbates French Creek's barracks deficiencies.</p> <p>IMPACT IF NOT PROVIDED:</p> <p>Enlisted Marines from the Reconnaissance Battalion will continue to live in overcrowded, inadequate French Creek area barracks while traveling 24 miles round trip to Courthouse Bay for work every day.</p> <p>ADDITIONAL: ECONOMIC ALTERNATIVES CONSIDERED</p> <p>a. Status Quo: This is not a viable alternative because continued residence in the French Creek area barracks will perpetuate the overcrowded, inadequate conditions and force junior Reconnaissance Battalion enlisted Marines to travel excessive distances back and forth to work.</p> <p>b. Renovation/Modernization: This is not a viable alternative because the French Creek area is seriously short manspaces even without the extra loading caused by the Reconnaissance Battalion Marines. Renovation or modernization would not resolve this deficiency.</p> <p>c. Lease: This is a viable alternative but not economically justified or militarily prudent because net present value calculations indicate that lease of a hotel or apartment complex off-base would cost two and a half</p>		

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<p>(...continued)</p> <p>times (NPV \$58M) that of new construction (NPV \$23M) and housing junior enlisted Marines far away off-base would impair unit cohesiveness, supervision capabilities, and workforce efficiency. Paying Marines Basic Allowances for Housing (BAH) and subsistence to rent individual apartments or homes off-base would also be far more expensive than new construction and would also impair unit cohesiveness, supervision capabilities, and workforce efficiency.</p> <p>d. New Construction: This is a viable alternative because it would economically construct (NPV \$23M) adequate and modern bachelor housing for the Reconnaissance Battalion Marines in the Courthouse Bay area while easing the crowded conditions in the French Creek area.</p> <p>e. Analysis Result: Net present value calculations and military prudence indicate that new construction is the most economical and viable alternative.</p> <p>An additional alternative considered was Pay Housing Allowances. This is a viable alternative but not recommended because net present calculations indicate that paying basic allowances for housing would cost almost double (NPV \$43M) that of new construction (NPV \$23M).</p>		
12. Supplemental Data:		
<p>A. Estimated Design Data: (Parametric estimates have been used to develop project costs. Project design conforms to Part II of Military Handbook 1190, Facility Planning and Design guide)</p> <p>(1) Status:</p> <p>(A) Date Design Started..... 07/99</p> <p>(B) Date Design 35% Complete..... 02/00</p> <p>(C) Date Design Complete..... 05/00</p> <p>(D) Percent Complete As Of September 1999..... 30%</p> <p>(E) Percent Complete As Of January 2000..... 60%</p> <p>(2) Basis:</p> <p>(A) Standard or Definitive Design: No</p> <p>(B) Where Design Was Most Recently Used: DSGN BUILD</p> <p>(3) Total Cost (C) = (A) + (B) Or (D) + (E):</p> <p>(A) Production of Plans and Specifications..... 850</p> <p>(B) All Other Design Costs..... 430</p> <p>(C) Total..... 1280</p> <p>(D) Contract..... 1140</p> <p>(E) In-House..... 140</p> <p>(F) Parametric Estimate used to develop cost..... Yes</p> <p>(G) Energy study/life-cycle analysis performed..... Yes</p> <p>(4) Construction Start..... 12/00</p>		

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<p>(...continued)</p> <p>(5) Construction Complete..... 02/02</p> <p>B. Equipment associated with this project which will be provided from other appropriations:</p> <table border="1" data-bbox="191 527 1284 684"> <thead> <tr> <th data-bbox="191 558 391 615">Equipment Nomenclature</th> <th data-bbox="695 558 911 615">Procuring Appropriation</th> <th data-bbox="911 527 1122 615">Fiscal Year Appropriated Or Requested</th> <th data-bbox="1182 558 1284 615">Cost (\$000)</th> </tr> </thead> <tbody> <tr> <td data-bbox="191 646 521 684">Collateral Equipment</td> <td data-bbox="695 646 797 684">O&M, MC</td> <td data-bbox="987 646 1057 684">2002</td> <td data-bbox="1214 646 1284 684">1935</td> </tr> </tbody> </table> <p data-bbox="159 716 1003 747">Activity POC: Larry Brant Phone No: (910) 451-1833</p>			Equipment Nomenclature	Procuring Appropriation	Fiscal Year Appropriated Or Requested	Cost (\$000)	Collateral Equipment	O&M, MC	2002	1935
Equipment Nomenclature	Procuring Appropriation	Fiscal Year Appropriated Or Requested	Cost (\$000)							
Collateral Equipment	O&M, MC	2002	1935							



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NAVAL FACILITIES ENGINEERING COMMAND

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CHARRETTE WORKSHOP PARTICIPANTS

CONCEPT #1



PROEJCT: P-159 BACHELOR ENLISTED QUARTERS
Marine Corps Base, Camp Lejeune, North Carolina

DATE: ~~MAY 10, 1999~~
DEC. 6, 1999

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CONCEPT #1



DATE: ~~MAY 10~~, 1999

[illegible]

CHARRETTE WORKSHOP PARTICIPANTS

CONCEPT #2



PROEJCT: P-159 BACHELOR ENLISTED QUARTERS
Marine Corps Base, Camp Lejeune, North Carolina

DATE: 08 DEC 1,999

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CONCEPT NO. 2



DATE: 08 DEC 1999

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CONCEPT #3 WORKSHOP PARTICIPANTS



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DATE: 10 DEC 1,999

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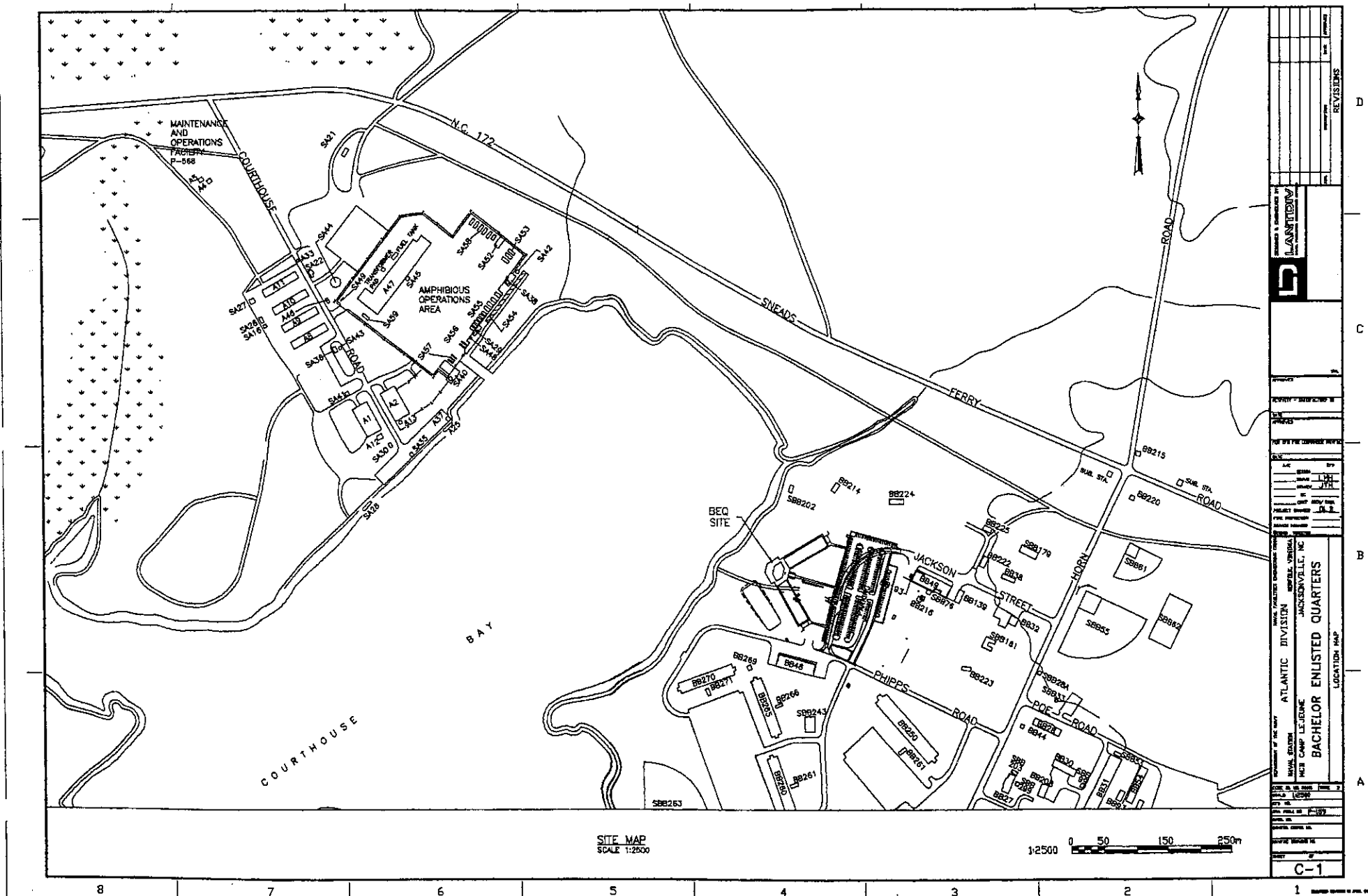
SECTION 3 – PROJECT DESCRIPTION

FY01 MCON Project P-159A will construct a new 8500 SM BEQ in the Courthouse Bay Area of MCB Camp Lejeune. The final design concept is based on two-three story building wings in a symmetrical “V” shaped configuration, with a one story core area building connecting the two wings. The new building will be brick and masonry with asphalt shingle roof, and is located near the waterfront at the west side of the project site. The two sleeping room wings include 100 - 2X0 modules, with laundry rooms located at the far end of each wing. Structural building design will be based upon a space frame to comply with force protection design requirements for three story buildings.

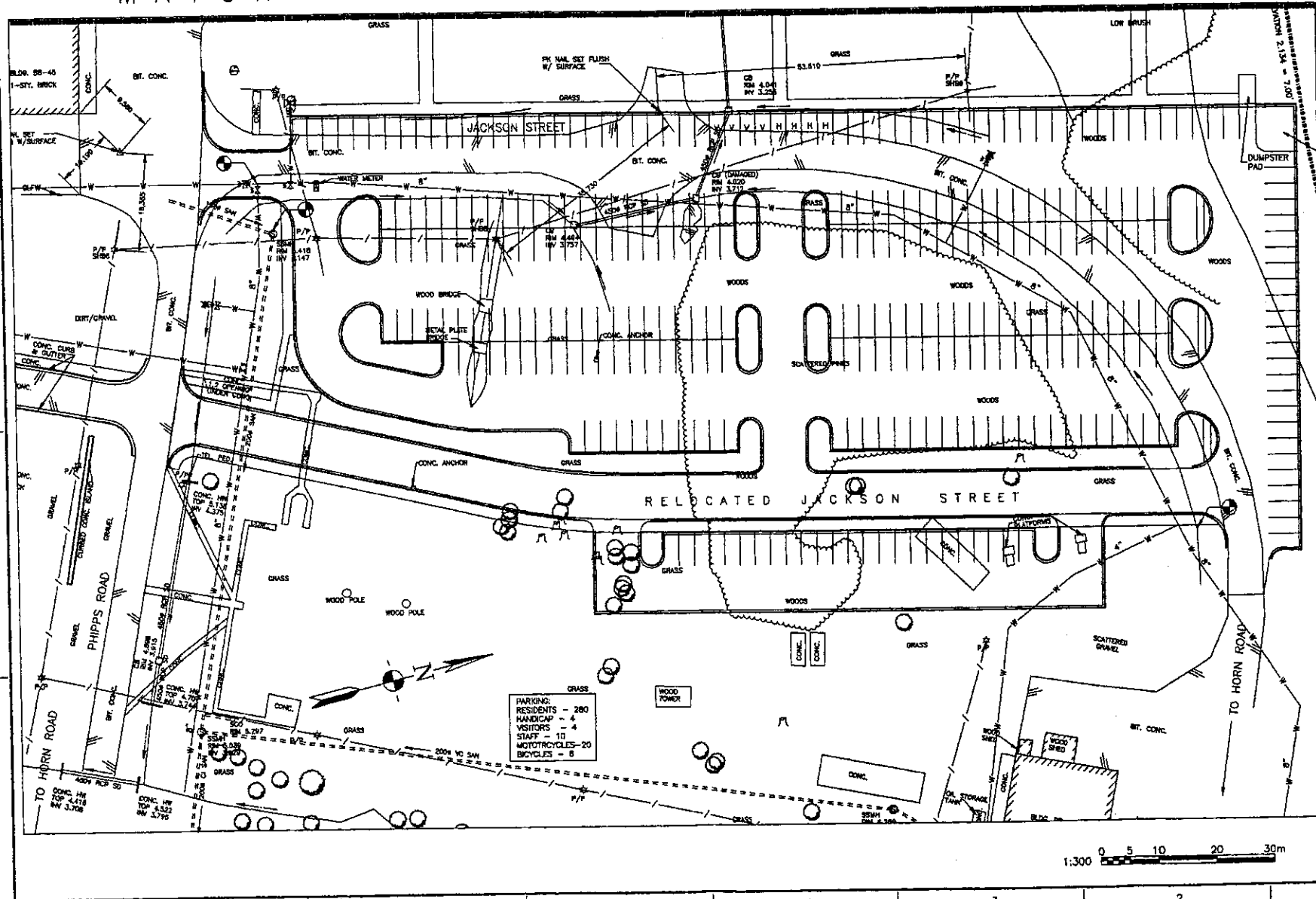
The parking lot is located on the east side in front of the building, compatibly sited for the continued westward development of the site for the future mess hall. The site design provides for a minimum 80ft setback from the building and landscaping treatments to comply with force protection requirements. Exterior securable washdown/drying areas will be provided at each end of the building. The stormwater retention pond will be designed to accommodate expansion to support the future mess hall to be constructed to the east of the parking lot.

The proposed acquisition method for this project will be based on a best value source selection, two phase design/build RFP. The RFP will present the final design concept as one acceptable design solution. Available funding will be identified. Proposers will have the opportunity to submit technical and price proposals based either on the RFP design concept, or a modified design concept that complies with RFP technical requirements. Contract award will be based on the proposer providing the best value to the Government.

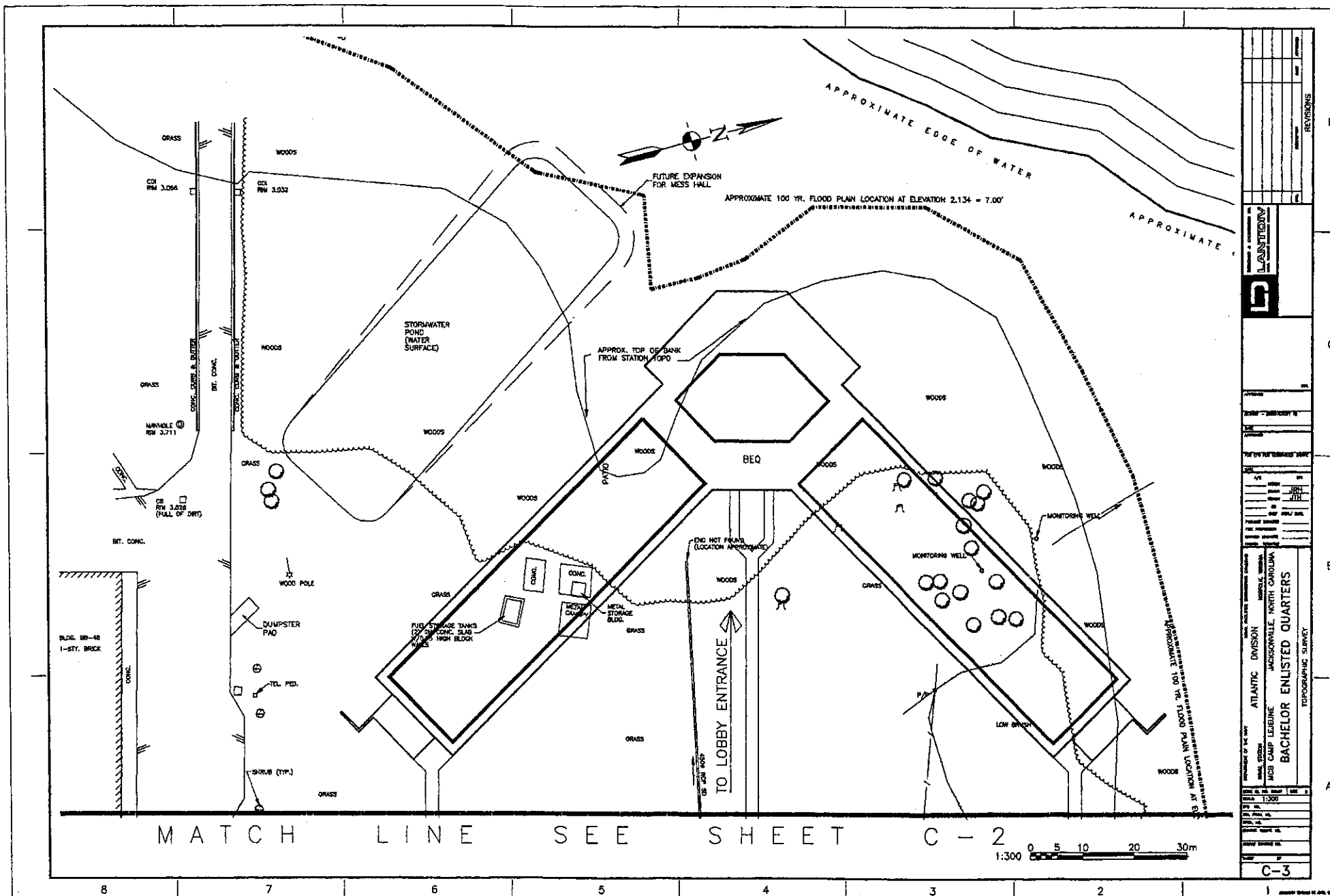
The remainder of this section includes the concept design drawings and cost estimate information.



MATCH LINE SEE SHEET C - 3



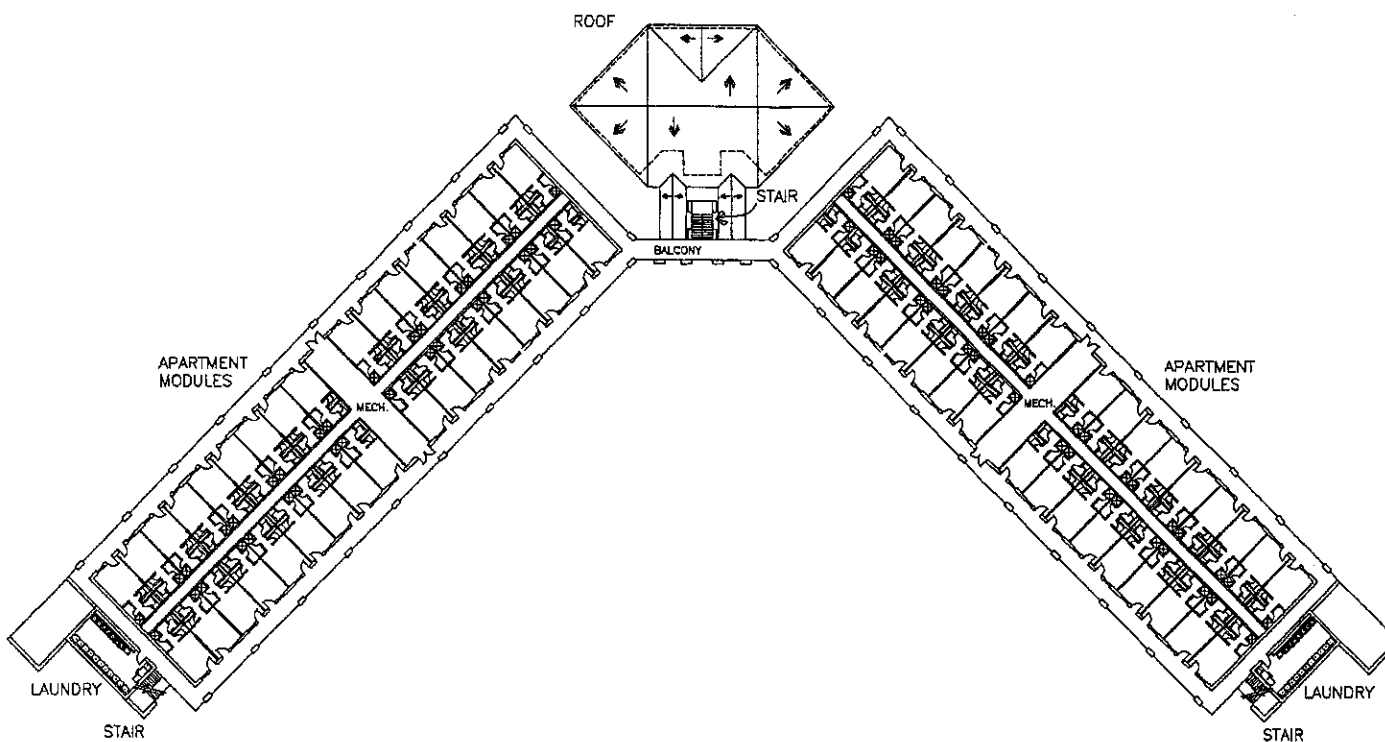
C-2



REVISIONS	
NO.	DATE
1	10/1/50
PROJECT: ATLANTIC DIVISION AREA: JACKSONVILLE, NORTH CAROLINA TITLE: BACHELOR ENLISTED QUARTERS TOPOGRAPHIC SURVEY	
DRAWN BY: [Name] CHECKED BY: [Name] DATE: 10/1/50	
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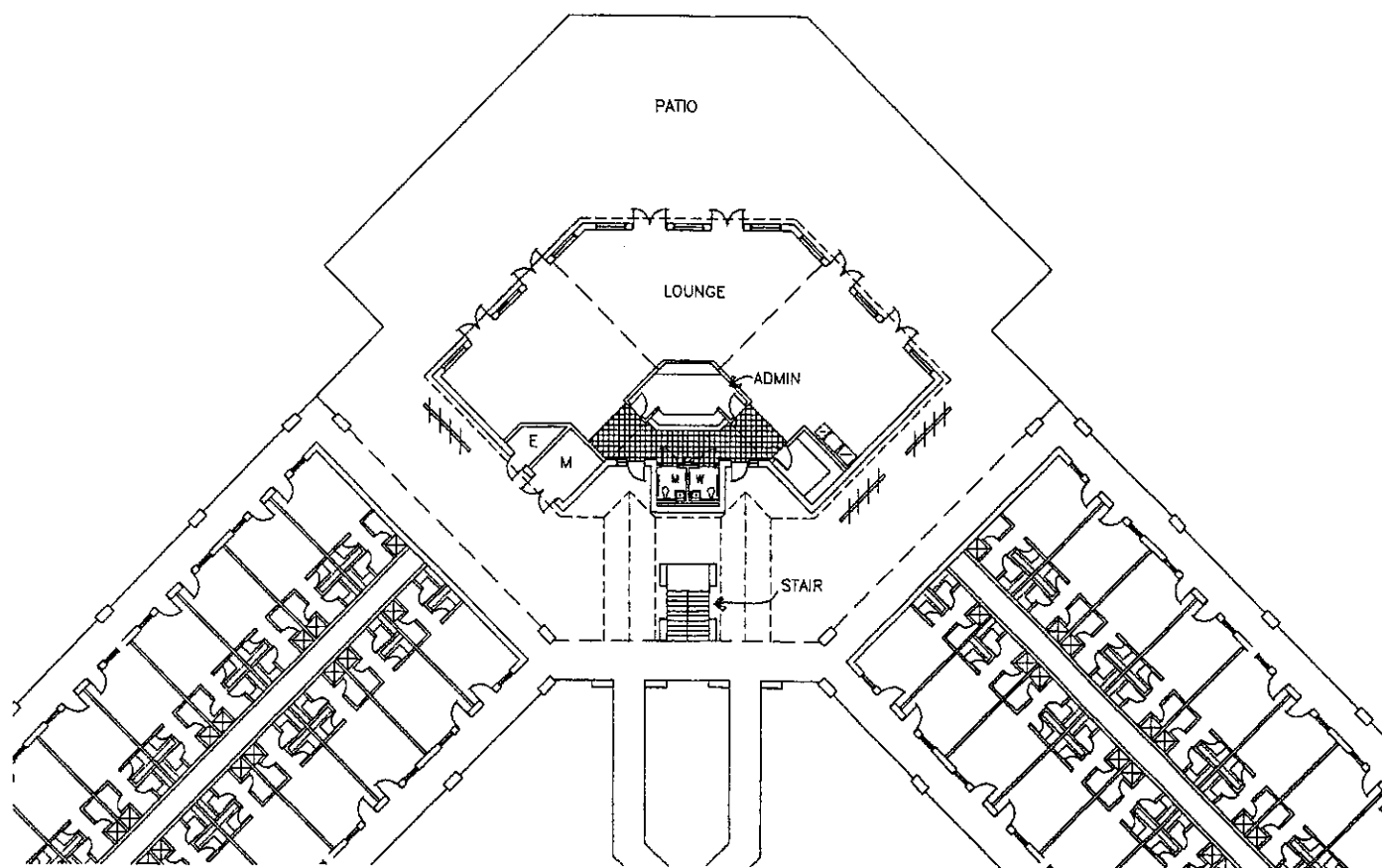
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THIRD FLOOR PLAN

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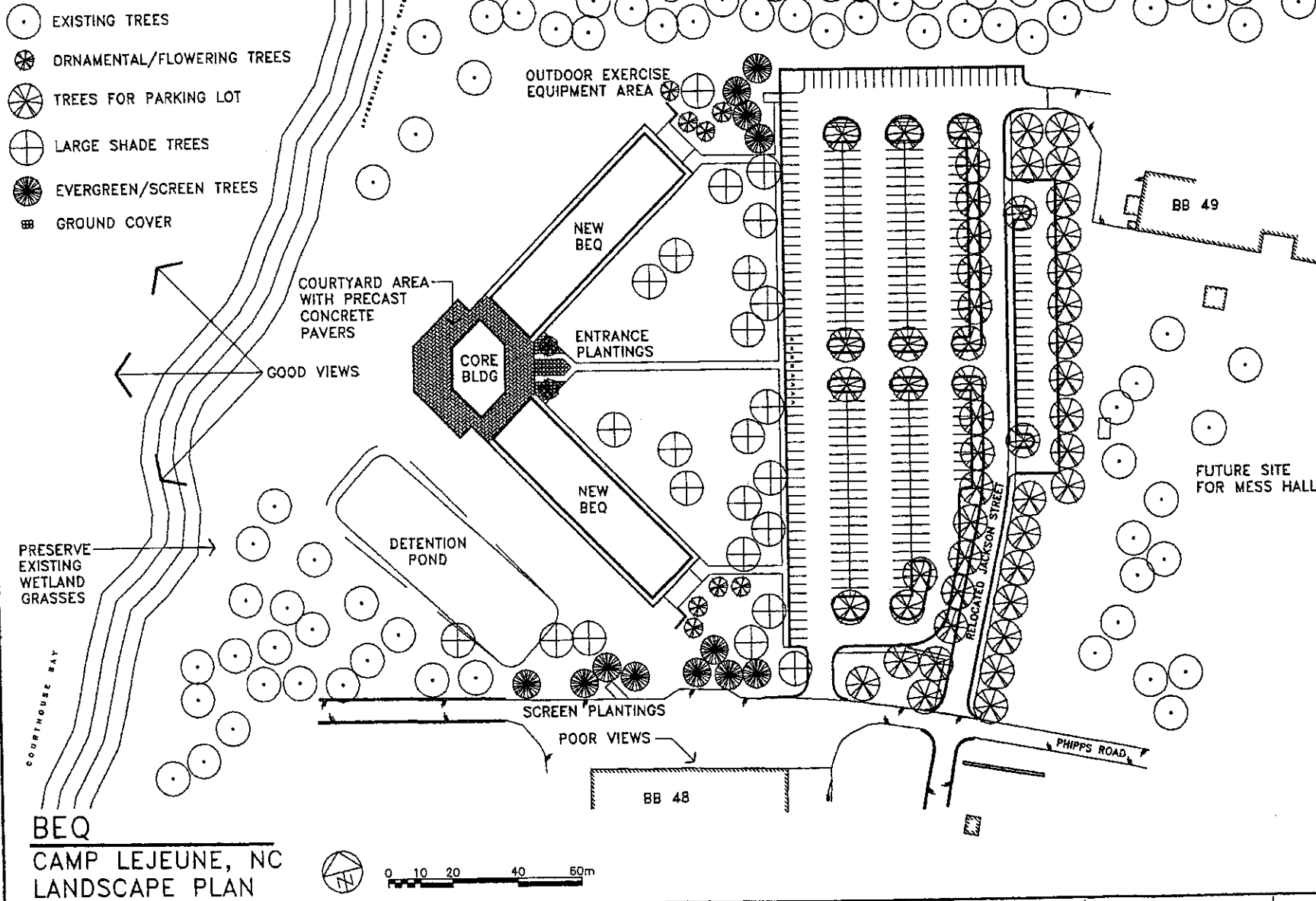
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PLANT KEY

- EXISTING TREES
- ⊗ ORNAMENTAL/FLOWERING TREES
- ⊗ TREES FOR PARKING LOT
- ⊕ LARGE SHADE TREES
- ⊗ EVERGREEN/SCREEN TREES
- GROUND COVER



REVISIONS	
NO.	DESCRIPTION
1	ISSUED FOR CONSTRUCTION
2	FOR THE FUTURE MESS HALL
3	FOR THE FUTURE MESS HALL
4	FOR THE FUTURE MESS HALL
5	FOR THE FUTURE MESS HALL
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10	FOR THE FUTURE MESS HALL
PROJECT: BACHELOR ENLISTED QUARTERS LOCATION: JACKSONVILLE, NORTH CAROLINA DIVISION: ATLANTIC CONCEPT 3 LANDSCAPE PLAN L-1	

BEQ
CAMP LEJEUNE, NC
LANDSCAPE PLAN

P-159, BEQ, Camp Lejeune, NC 5F9127

Concept Comparisons

	<u>Concept Costs</u>		
<u>PRIMARY FACILITY</u>	<u>Concept 1</u>	<u>Concept 2</u>	<u>Concept 3</u>
BEQ, 100 2+0 mods	10,736,000	10,064,000	10,064,000
SM unit cost is the adjusted award cost for P-587, BEQ New River			
Force Protection (using tempered glass in place of annealed glass, no change in frames)	0	0	0
<u>DESIGN FEE 2% of Primary Facility</u>	200,000	200,000	200,000
<u>SUPPORTING FACILITIES</u>	2,145,374	1,896,374	1,836,374
PILING	112,374.00	112,374.00	112,374.00
<u>ELECTRICAL UTILITIES</u>	348,000	348,000	348,000
Electrical Distribution, Primary	52,000	52,000	52,000
Electrical Distribution, Secondary	30,000	30,000	30,000
Substation/Transformer	85,000	85,000	85,000
Area Lighting	175,000	175,000	175,000
Communication, Telephone	3,000	3,000	3,000
Communication, Fire Alarm	3,000	3,000	3,000
<u>MECHANICAL UTILITIES</u>	168,000	142,000	142,000
Heat Distribution, Underground	94,000	58,000	58,000
Water Distribution	32,000	32,000	32,000
Sanitary Sewers	42,000	52,000	52,000
<u>ROADS, PARKING, SIDEWALKS</u>	346,000	350,000	350,000
Bituminous Paving	287,000	287,000	287,000
Concrete Walks	59,000	59,000	59,000
Dumpster Pads		4,000	4,000
<u>SITE IMPROVEMENTS</u>	998,000	771,000	711,000
Earthwork: Site Grading	7,000	7,000	7,000
Earthwork: Move Soil From Pond		17,000	17,000
Topsoil/Seed/Sod	123,000	26,000	26,000
Borrow	82,000	106,000	106,000
Environmental Protection	24,000	24,000	24,000
Storm Drainage Piping	282,000	252,000	252,000
Landscaping	234,000	75,000	75,000
Oil/Water Separator	44,000	0	0
Rinse Pad For Personal Equipment	2,000	2,000	2,000
Grit Chambers For Rinse Pads		40,000	80,000
Drying Areas For Equipment		22,000	22,000
Storm Water Retention Pond	200,000	200,000	100,000
<u>DEMOLITION</u>	173,000.00	173,000.00	173,000.00
Demo Pavements: Bit/Conc/Swalk	51,000	51,000	51,000
Demo Storm/Water Line	27,000	27,000	27,000
Demo O/H Electrical Line	9,000	9,000	9,000
Demo Bridges/Bldg/Tanks	2,000	2,000	2,000
Demo: Site Clearing	84,000	84,000	84,000
TOTAL COST	13,081,374	12,160,374	12,100,374

Concept #1 to #2 = Reduction of \$ 921,000

Concept #2 to #3 = Reduction of \$ 60,000
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P-159, BEQ, Camp Lejeune, NC 5F9127

CONCEPT #1

PRIMARY FACILITY	U/M	Quantity	\$/UM	Cost
BEQ, 100 2+0 mods	SM	9,067	1184.00	10,736,000
SM unit cost is the adjusted award cost for P-587, BEQ New River				
Force Protection (using tempered glass in place of annealed glass, no change in frames)	SM	-	40.89	0
DESIGN FEE 2% of Primary Facility	LS	1	200,000.00	200,000
SUPPORTING FACILITIES	LS			2,145,374
PILING	M	4,162	27	112,374.00
ELECTRICAL UTILITIES	LS			348,000
Electrical Distribution, Primary	M	130	392.57	52,000
Electrical Distribution, Secondary	M	50	599.45	30,000
Substation/Transformer	KVA	750	113.33	85,000
Area Lighting	EA	50	3,500.00	175,000
Communication, Telephone	M	50	55.00	3,000
Communication, Fire Alarm	M	50	50.00	3,000
MECHANICAL UTILITIES	LS			168,000
Heat Distribution, Underground	M	100	936.10	94,000
Water Distribution	M	639	49.42	32,000
Sanitary Sewers	M	517	81.11	42,000
ROADS, PARKING, SIDEWALKS	LS			346,000
Bituminous Paving	SM	11,705	24.45	287,000
Concrete Walks	SM	1,568	37.37	59,000
Staging area for equipment	SY	-	50.00	0
SITE IMPROVEMENTS	LS			998,000
Earthwork	SM	28,328	0.24	7,000
Topsoil/Seed/Sod	CM	13,005	9.40	123,000
Borrow	CY	5,000	16.30	82,000
Environmental Protection	HA	3	8,369.00	24,000
Storm Drainage Piping	M	1,067	264.21	282,000
Landscaping	SM	2,270	102.94	234,000
Oil/Water Separator	L	20,428	2.11	44,000
Rinse Pad	SM	28	58.00	2,000
Storm Water Retention Pond	LS	1	200,000.00	200,000
DEMOLITION				173,000.00
Demo Pavements: Bit/Conc/Swalk	SM	3,169	16.00	51,000
Demo Storm/Water Line	M	335	78.00	27,000
Demo O/H Electrical Line	M	213	39.00	9,000
Demo Bridges/Bldg/Tanks	LS	1	1,120.00	2,000
Demo: Site Clearing	HA	3	30,000.00	84,000
TOTAL COST				13,081,374

P-159, BEQ, Camp Lejeune, NC 5F9127

CONCEPT #2

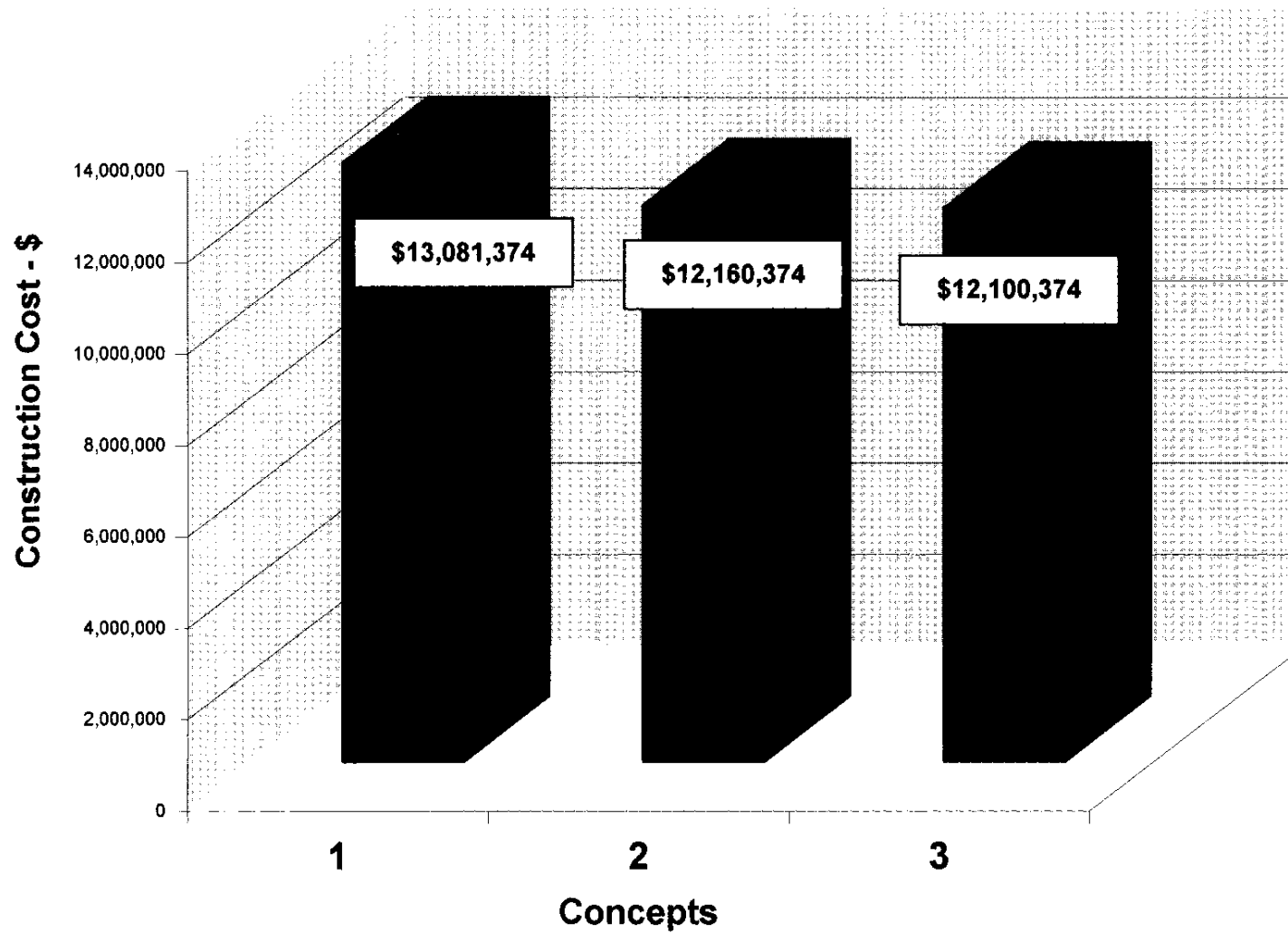
PRIMARY FACILITY	U/M	Quantity	\$/UM	Cost
BEQ, 100 2+0 mods	SM	8,500	1184.00	10,064,000
SM unit cost is the adjusted award cost for P-587, BEQ New River				
Force Protection (using tempered glass in place of annealed glass, no change in frames)	SM	-	40.89	0
DESIGN FEE 2% of Primary Facility	LS	1	200,000.00	200,000
SUPPORTING FACILITIES	LS			1,896,374
PILING	M	4,162	27	112,374.00
ELECTRICAL UTILITIES	LS			348,000
Electrical Distribution, Primary	M	130	392.57	52,000
Electrical Distribution, Secondary	M	50	599.45	30,000
Substation/Transformer	KVA	750	113.33	85,000
Area Lighting	EA	50	3,500.00	175,000
Communication, Telephone	M	50	55.00	3,000
Communication, Fire Alarm	M	50	50.00	3,000
MECHANICAL UTILITIES	LS			142,000
Heat Distribution, Overhead	M	122	468.05	58,000
Water Distribution	M	639	49.42	32,000
Sanitary Sewers	M	717	72.01	52,000
ROADS, PARKING, SIDEWALKS	LS			350,000
Bituminous Paving	SM	11,705	24.45	287,000
Concrete Walks	SM	1,568	37.37	59,000
Dumpster Pads	EA	2	1,750.00	4,000
SITE IMPROVEMENTS	LS			771,000
Earthwork: Site Grading	SM	28,328	0.24	7,000
Earthwork: Move Soil From Pond	CM	5,355	3.11	17,000
Topsoil/Seed/Sod	SM	7,312	3.42	26,000
Borrow	CM	7,650	13.80	106,000
Environmental Protection	HA	2.80	8,369.00	24,000
Storm Drainage Piping	M	957	262.47	252,000
Landscaping	LS	1	75,000.00	75,000
Rinse Pad For Personal Equipment	SM	28	58.00	2,000
Grit Chamber For Rinse Pad	LS	1	40,000.00	40,000
Drying Areas For Equipment	SM	186	113.57	22,000
Storm Water Retention Pond	LS	1	200,000.00	200,000
DEMOLITION				173,000.00
Demo Pavements: Bit/Conc/Swalk	SM	3,169	16.00	51,000
Demo Storm/Water Line	M	335	78.00	27,000
Demo O/H Electrical Line	M	213	39.00	9,000
Demo Bridges/Bldg/Tanks	LS	1	1,120.00	2,000
Demo: Site Clearing	HA	3	30,000.00	84,000
TOTAL COST				12,160,374

P-159, BEQ, Camp Lejeune, NC 5F9127

Concept #3

PRIMARY FACILITY	U/M	Quantity	\$/UM	Cost
BEQ, 100 2+0 mods	SM	8,500	1184.00	10,064,000
SM unit cost is the adjusted award cost for P-587, BEQ New River				
Force Protection (using tempered glass in place of annealed glass, no change in frames)	SM	-	40.89	0
DESIGN FEE 2% of Primary Facility	LS	1	200,000.00	200,000
SUPPORTING FACILITIES	LS			1,836,374
PILING	M	4,162	27	112,374.00
ELECTRICAL UTILITIES	LS			348,000
Electrical Distribution, Primary	M	130	392.57	52,000
Electrical Distribution, Secondary	M	50	599.45	30,000
Substation/Transformer	KVA	750	113.33	85,000
Area Lighting	EA	50	3,500.00	175,000
Communication, Telephone	M	50	55.00	3,000
Communication, Fire Alarm	M	50	50.00	3,000
MECHANICAL UTILITIES	LS			142,000
Heat Distribution, Overhead	M	122	468.05	58,000
Water Distribution	M	639	49.42	32,000
Sanitary Sewers	M	717	72.01	52,000
ROADS, PARKING, SIDEWALKS	LS			350,000
Bituminous Paving	SM	11,705	24.45	287,000
Concrete Walks	SM	1,568	37.37	59,000
Dumpster Pads	EA	2	1,750.00	4,000
SITE IMPROVEMENTS	LS			711,000
Earthwork: Site Grading	SM	28,328	0.24	7,000
Earthwork: Move Soil From Pond	CM	5,355	3.11	17,000
Topsoil/Seed/Sod	SM	7,312	3.42	26,000
Borrow	CM	7,650	13.80	106,000
Environmental Protection	HA	2.80	8,369.00	24,000
Storm Drainage Piping	M	957	262.47	252,000
Landscaping	LS	1	75,000.00	75,000
Rinse Pad For Personal Equipment	SM	28	58.00	2,000
Grit Chambers For Rinse Pads	LS	2	40,000.00	80,000
Drying Areas For Equipment	SM	186	113.57	22,000
Storm Water Retention Pond	LS	1	100,000.00	100,000
DEMOLITION				173,000.00
Demo Pavements: Bit/Conc/Swalk	SM	3,169	16.00	51,000
Demo Storm/Water Line	M	335	78.00	27,000
Demo O/H Electrical Line	M	213	39.00	9,000
Demo Bridges/Bldg/Tanks	LS	1	1,120.00	2,000
Demo: Site Clearing	HA	3	30,000.00	84,000
TOTAL COST				12,100,374

P-159 BEQ CAMP LEJEUNE, NC



SECTION 4 – DESIGN CHARRETTE PROCESS

Introduction

A Function Analysis Concept Development (FACD)/Design Charrette (DC) workshop was conducted on the design of MCON FY01 project P-159 Bachelor Enlisted Quarters, Marine Corps Base, Camp Lejeune, North Carolina for the Atlantic Division (LANTDIV) of the Naval Facilities Engineering Command (NAVFACENGCOM). The project is being design by LANTDIV as a design/construct procurement project. The design charrette process is part of the project design development process.

The primary DC team included personnel from LANTDIV, 20 Reconnaissance Battalion, MCB Camp Lejeune Public Works Office, and the MCBCL Facilities Management Department, and the DC facilitator from Lewis & Zimmerman Associates, Inc. The DC was conducted from 06 – 10 December at the Comfort Inn, Jacksonville, NC.

Design Charrette Process

The goal of the DC process was to develop a project that could be constructed within the available budget and meet the users' functional needs. The approach used was similar to a FACD process but with a duration of five (5) days instead of the more typical 10 days used in a FACD study. This approach uses function analysis techniques and the value engineering (VE) job plan to bring the owners and users into the design process and incorporate their spacial and functional needs into a concept design which can progress either to the 35% design stage, or the design/build stage and meet the above-stated goals.

The VE Job Plan guides the DC work activities and the basic schedule. The Job Plan consists of six phases: Information Phase, Function Analysis Phase, Creative Phase, Evaluation Phase, Development Phase, and Presentation Phase. Within the DC process, VE is one of the tools employed to help attain the project goals. The DC process is somewhat unique in that the duration of the study is only five days, and several iterations of design approaches are conceptualized, schematically designed, and presented to the owner and user for comments and enhancements. Some concepts may be eliminated, while others are re-molded to more closely fit the functional needs.

For this project, a DC kickoff meeting was conducted on 06 December at the Comfort Inn, Jacksonville, NC. At this meeting, the DC process was presented to the group, the agenda reviewed, and specific meeting times were confirmed.

At the start of the workshop, the LANTDIV design team presented Concept #1 which had been developed in the weeks that preceded the DC workshop. Concept #1 is the starting point for the DC process and is the basis for the function analysis and creative discussions.

During the function analysis the participants were asked to identify key functions to be accomplished by the project. These functions are presented on the Random Function Analysis worksheets. The function analysis identified several key functions that needed to be included in the project. The following were noted:

- Space for equipment/gear washdown outside
- Drying of equipment/gear
- Office for Duty Officer
- Desire for BBQ's, picnic tables, and exercise stations outside the building

Following the function analysis the facilitator leads the DC team through a session to generate a list of project concerns and ideas to improve the project in terms of the established functions and budget. The team evaluated the ideas as to whether they are:

- To be investigated/incorporated
- Not to be investigated/incorporated
- Already being done
- Over-taken by events

If an idea was to be incorporated, the lead discipline team member was assigned. The design team, working in the conference room, developed Concept No. 2, incorporating the recommended creative ideas and further refining the design through a series of meeting with the end users, Public Works, and other LANTDIV project management team members.

After the presentation of Concept No. 2, a number refinements were made to the BEQ lounge area, laundry, and mechanical spaces. The comments generated during each creative session are included in Section 4 of the report. As the team progresses during the workshop, the design team responds to the ideas as their ultimate disposition in the next concept. Pertinent meeting agendas, meeting minutes, and telephone conversation records are also included in Section 4.

The objective of Concept #3 is for use in optimizing the functional needs of the building. or the Final Concept presentation is to obtain formal acceptance from all appropriate representatives. During the final presentation, comments were gathered on Concept #3. These minor modifications are then included, and become the Final Concept. Once the endorsements were obtained, they were copied and included in Section 1 on the report. The final DC report was distributed to the entire team to conclude the workshop effort.

DESIGN CHARRETTE WORKSHOP AGENDA

P-159 Bachelor Enlisted Quarters, Function Analysis Design Charrette

Marine Corps Base

Camp Lejeune, North Carolina

Dates: 6 December - 10 December 1999

Location: Comfort Suites
130 Workshop Lane
Jacksonville, NC 28546
Phone: 910-346-8900

Facilitator: David A. Hamilton, PE, CVS
Lewis & Zimmerman Associates, Inc.

DATE/TIME	ACTIVITY	LEAD BY
Monday 6 December		
0900	Meeting room and equipment set-up	Hamilton
1200	Project Development Team (PDT) Group Meetings	Bryant, Harris, Harrison
1300	Kick-off meeting - Introductions and Opening Comments on Function Analysis Charrette Process: NAVFAC Facilitator	Bryant Hamilton
	User group opening presentation/review of facility functions (what they do, how they do it, etc.) and expectations of process	USMC, Harris, Hamilton
	Comments on Functions of Facility/Function Analysis	Hamilton
	Concept #1 Presentation Each discipline makes presentation of their initial concept for the project. As the Design Team present their aspect of the project concept, they should include comments on how they expect the facilities to function, based on their current understanding of the Users' operations.	PDT
	Comment Phase: The Project Development Team is open to receive comments on the concept design. The team will brainstorm ways in which to address these comments and ways in which to improve the design in order to respond to functional requirements, to reduce life cycle costs and to resolve emerging issues.	Hamilton
	Task Assignments: Based on the work of this day, PDT members will receive assignments required to be incorporated into the next Concept Presentation.	Bryant

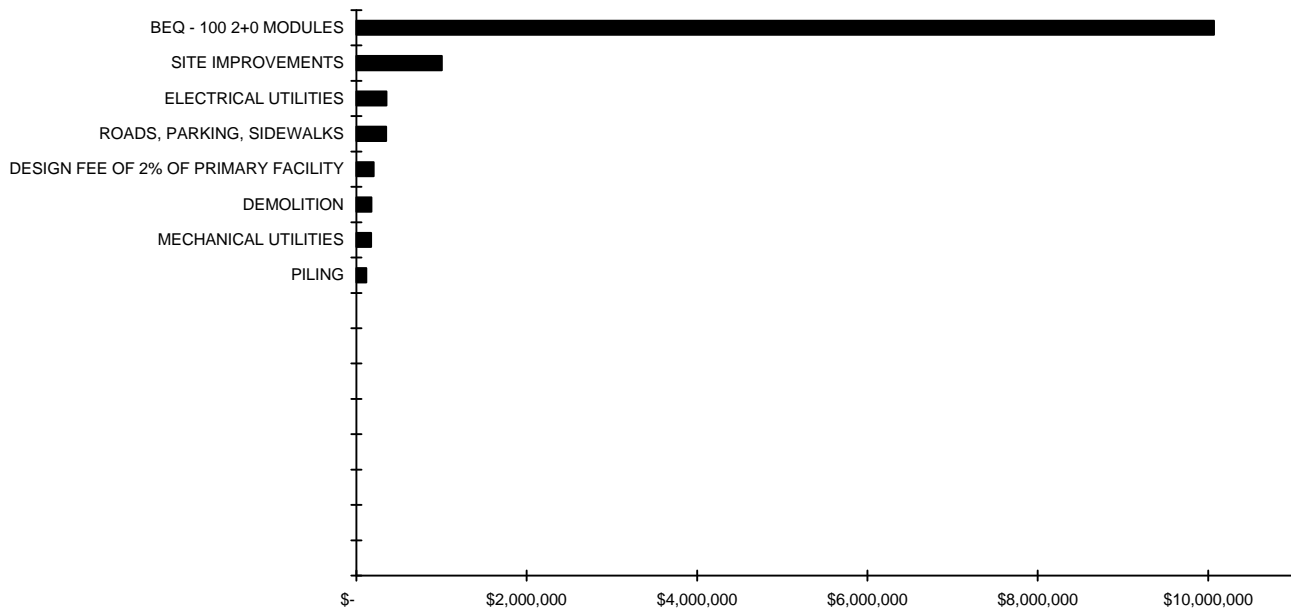
DATE/TIME	ACTIVITY	LEAD BY
Tuesday 7 December		
0800	Group Meetings: PDT members meet with base and user counterparts during the day to resolve issues and obtain additional information.	PDT
	The PDT works on the development of Concept #2 based on information received the previous day.	PDT
1700	Team meeting to assess progress. Each discipline reports on progress to date.	Bryant, Hamilton
Wednesday 8 December		
0800	Continue design and investigation work. Prepare for Concept #2 Presentation	Bryant
1200	PDT assembles and prepares for presentation.	Bryant
1300	Concept #2 Presentation Each discipline will make a presentation of their findings and recommendations. Presentation should include key sketches and hand-outs as required to inform participants and to invite their comments.	PDT
	Comment Phase: The team will brainstorm ways in which to address these comments and ways in which to improve the design in order to respond to functional requirements, to reduce life cycle costs and to resolve emerging issues.	Hamilton
	Task Assignments: Based on the work of this day, PDT members will receive assignments required to be incorporated into the next Concept Presentation. Work begins on developing the Final Concept.	Bryant
Thursday 9 December		
0800	The PDT continues work on the development of Concept #3 and preparations for the presentation of this concept.	PDT
1700	Team meeting to review progress and to prepare for Final Concept Presentation.	Bryant, Hamilton
Friday 10 December		
0730	PDT assembles and prepares for presentation.	Bryant
0800	Final Concept Presentation Formal presentation of final concept. All disciplines make brief but comprehensive presentations. The PDT will identify the status of remaining issues and plans for their resolution. The attendees will be presented copies of the Charrette report and will be invited to submit their final comments in writing. The Team members will make copies of comment and response sheets for circulation.	PDT
1200	SIGN-OFF MEETING: All participants sign-off on the final Charrette report.	Bryant, Hamilton



PROJECT: P-159, BEQ, CAMP LEJEUNE, NC 5F9127

DESIGN: CONCEPT #1	COST	PERCENT	CUM. PERCENT
BEQ - 100 2+0 MODULES	\$ 10,064,000	81.10%	81.10%
SITE IMPROVEMENTS	\$ 998,000	8.04%	89.14%
ELECTRICAL UTILITIES	\$ 348,000	2.80%	91.95%
ROADS, PARKING, SIDEWALKS	\$ 346,000	2.79%	94.73%
DESIGN FEE OF 2% OF PRIMARY FACILITY	\$ 200,000	1.61%	96.35%
DEMOLITION	\$ 173,000	1.39%	97.74%
MECHANICAL UTILITIES	\$ 168,000	1.35%	99.09%
PILING	\$ 112,374	0.91%	100.00%
Totals	\$ 12,409,374	100.00%	

Graphic Pareto Analysis



* Costs per the CONCEPT #1 SUBMITTAL.

RANDOM FUNCTION ANALYSIS



PROJECT: BACHELOR ENLISTED QUARTERS <i>Marine Corps Base, Camp Lejeune, North Carolina</i>		SHEET NO.: 1 of 1	
	FUNCTION		
DESCRIPTION	VERB	NOUN	KIND
Overall Project	House	Marines	B
	Store	Gear	RS
	Store	Clothes	RS
	Launder	Clothes	S
	Recreate	Personnel	S
	Park	Cars	RS
	Cook	Food	S
	Store	Food	S
	Refrigerate	Food	S
	Light	Space	RS
	Heat/Cool	Space	RS
	Control	Environment	RS
	Monitor	Personnel	S
	Secure	Facility	RS
	Wash	Gear	S
	Supply	Utilities	B
	Centralize	Facilities	S
	Protect	Building	RS
	Anticipate	Threats	RS
	Minimize	Maintenance	RS
	Stage	Trash	S
	Accomplish	Mission	HO
	Maintain	Readiness	HO
	Construct	Facility	LO
	Improve	Site	S
	Meet	Codes	RS
Function defined as: Action Verb Measurable Noun			
Kind of Function: B = Basic S = Secondary RS = Required Secondary			
HO = Higher Order LO = Lower Order			

CONCEPT NO. 1 COMMENTS/CREATIVE IDEA LISTING



PROJECT: P-159 BACHELOR ENLISTED QUARTERS <i>Marine Corps Base, Camp Lejeune, North Carolina</i>			SHEET NO: 1 of 4
ALT. NO.	FUNCTION/IDEA/ DESCRIPTION	CHAMPION/ RATING	COMMENTS/DISPOSITION
GENERAL (G)			
G-1	Design facility for "Force Protection".	ABD	Yes, investigate cost implications.
ARCHITECTURAL (A)			
A-1	Store personal equipment/gear.	DS	Review space requirement and investigate various types of equipment. Consider drying requirements.
A-2	Wash personnel equipment and clothes.	DS	Review need for laundry facilities and possible wash down area outside.
A-3	Enclose space and meet requirement for 200 rooms.	ABD	Consider various 2 and 3 wing layouts.
A-4	Minimize separation between building wings and centralize facilities to the extent possible.	OBE	Investigate functional requirements for pedestrian flow and adjacencies.
A-5	Reduce the number of separate support buildings for chillers, laundry, etc.	ABD	Under further study.
A-6	HVAC – Consider ways to reduce the area of the 9' – 4" wide fan room.	ABD	Investigate size of equipment and minimum space requirements.
A-7	Review code impacts (need for sprinklers) if HVAC equipment is placed in the attic. (See FP-2)	OBE	Review code and calculate the cost impacts.
A-8	Need space for 2-duty officers at the BEQ.	DS	Add program space for one office w/phones, desks, etc.
Rating: X = Not To Be Investigated/Incorporated; DS = Design Suggestion; ABD = Already Being Done; OBE = Over-Taken By Events			

CONCEPT NO. 1 COMMENTS/CREATIVE IDEA LISTING



PROJECT: P-159 BACHELOR ENLISTED QUARTERS <i>Marine Corps Base, Camp Lejeune, North Carolina</i>			SHEET NO: 2 of 4
ALT. NO.	FUNCTION/IDEA/ DESCRIPTION	CHAMPION/ RATING	COMMENTS/DISPOSITION
ARCHITECTURAL (A)			
A-9	Need a deep sink on each floor for gear washing. A janitor's closet would work.	Jim/DS	Consolidate gear washing to one central location.
A-10	Consider the functions and space requirement for the lounge on the main floor.	ABD	Investigate typical use of this space and requirements.
A-11	Interior walls to be painted CMU.	ABD	Confirm need for CMU interior walls if "Force Protection" criteria is accepted.
A-12	Centralize the core spaces into a 1-story building, convenient to all wings.	DA	Review various possible locations.
A-13	Use mylar tinted glazing.	DS	Review cost impact.
A-14	Use a sloping metal roof for the building.	DS	Minimize the possible options that the D/B contractor could supply.
A-15	Do not use metal frame door/window combination on the exterior wall of the modules.	ABD	Consider alternate materials to minimize corrosion and reduce life cycle cost.
Rating: X = Not To Be Investigated/Incorporated; DS = Design Suggestion; ABD = Already Being Done; OBE = Over-Taken By Events			

CONCEPT NO. 1 COMMENTS/CREATIVE IDEA LISTING



PROJECT: P-159 BACHELOR ENLISTED QUARTERS <i>Marine Corps Base, Camp Lejeune, North Carolina</i>			SHEET NO: 3 of 4
ALT. NO.	FUNCTION/IDEA/ DESCRIPTION	CHAMPION/ RATING	COMMENTS/DISPOSITION
CIVIL (C)			
C-1	Add storage for personal gear outside building.	Leonard/DS	Consider possibilities using collateral equipment.
C-2	Provide shoreline improvements for docking and launching boats.	X	P-019 includes a pier. Therefore not needed under P-159.
C-3	Maintain future flexibility in the site planning.	ABD	Consider future uses and needs for expansion.
C-4	Place recreational space on north end of site.	ABD	Review types of recreation/equipment needed.
C-5	Leave parking lot on the west side with access from Jackson Rd.	ABD	Consider impact of "Force Protection" on parking lot
C-6	Include space for BBQ, trash enclosure, and a courtyard.	ABD	Incorporate into site planning.
C-7	Keep planting to a minimum. Use 6" maximum height.	ABD	Required by guidelines.
C-8	Keep landscaping and turf maintenance to a minimum.	ABD	Consider various types of plant materials available.
C-9	Add more parking spaces. Currently 280 cars, 20 motorcycles, 6 bicycles, 8 visitors, and 10 staff. (298 total). User would like 30 more parking spaces.	X	Guidelines set maximum at 70% of resident count.
C-10	Add an equipment/gear wash area outside.	ABD	Consider location, need for oil/water separator, and grit. Place on outer edge of facility near the parking lot.
C-11	Add two (2) trash enclosures.	ABD	Need to be 80ft. from building per "Force Protection" guidelines.
Rating: X = Not To Be Investigated/Incorporated; DS = Design Suggestion; ABD = Already Being Done; OBE = Over-Taken By Events			

CONCEPT NO. 1 COMMENTS/CREATIVE IDEA LISTING



PROJECT: P-159 BACHELOR ENLISTED QUARTERS <i>Marine Corps Base, Camp Lejeune, North Carolina</i>			SHEET NO: 4 of 4
ALT. NO.	FUNCTION/IDEA/ DESCRIPTION	CHAMPION/ RATING	COMMENTS/DISPOSITION
MECHANICAL (M)			
M-1	Reduce the width of the central mechanical chase from 4'-8" down to 4'-0".	Georg/ABD	Verify space needs for all utilities.
M-2	Use a VAV system with supply duct in chase.	ABD	Verify space requirements.
M-3	Reconsider cost of underground steam to feed the building.	DS	Use above ground steam distribution.
ELECTRICAL (E)			
E-1	Add a ceiling mounted fluorescent light fixture to each module.	Rick/ABD	Current guideline.
E-2	Add a ceiling fan with a light to each module.	ABD	Consider cost and quality of life improvement.
FIRE PROTECTION (FP)			
FP-1	Review types of detection equipment and location of central panels in conjunction with "Force Protection" criteria.	Doug/ABD	Review guidelines.
FP-2	Review the cost impact of fire sprinklers in attic.	OBE	Consider options and code requirements.
STRUCTURAL (S)			
S-1	Use exterior columns.	Sally/DS	Consider cantilevered balcony approach.
Rating: X = Not To Be Investigated/Incorporated; DS = Design Suggestion; ABD = Already Being Done; OBE = Over-Taken By Events			

CONCEPT NO. 2 COMMENTS/CREATIVE IDEA LISTING



PROJECT: P-159 BACHELOR ENLISTED QUARTERS <i>Marine Corps Base, Camp Lejeune, North Carolina</i>			SHEET NO: 1 of 1
ALT. NO.	FUNCTION/IDEA/ DESCRIPTION	CHAMPION/ RATING	COMMENTS/DISPOSITION
ARCHITECTURAL (A)			
A-1	Revise the lounge area to be more open space. Delete lobby area, move toilets, reduce Duty Office, and Bulk Storage areas.	Jim/DS	Will revise plan and incorporate in Concept #3.
A-2	Revise laundry area and add more dryers.	DS	Will incorporate in Concept #3.
A-3	Add central roof over stair tower.	DS	Will incorporate in Concept #3.
FIRE PROTECTION (FP)			
FP-1	Add fire pump to meet code and water pressure requirements.	Doug/DS	Will incorporate in Concept #3 design & cost estimate.
CIVIL (C)			
C-1	Redesign stormwater pond to allow for future flows from the Mess Hall.	Leonard/DS	Will allocate space for future pond area.
C-2	Eliminate the gear/wash storage area on the north end of the building adjacent to the parking lot.	DS	Will remove from the site plan.
C-3	Provide 2 nd dumpster pad on north end of building adjacent to parking lot.	DS	Will add to site layout.
Rating: X = Not To Be Investigated/Incorporated; DS = Design Suggestion; ABD = Already Being Done; OBE = Over-Taken By Events			

MEETING MINUTES/ PHONE CONVERSATION RECORD

DATE: 07 December 1999
TIME: 10:00AM
LOCATION: (if meeting) Planning/Facilities Dept., PWC, Camp Lejeune
RE: BEQ siting and associated parking with respect to future Mess Hall

ATTENDEES/PARTICIPANTS:

<u>Name</u>	<u>Function</u>	<u>Organization</u>
Larry Brandt	Civil Engineer	Facilities Dept.
Fred Estes	Facilities Planner	Planning Dept.
Sonny Harrison	Project Leader	LANTDIV
Leonard Harrell	Civil Engineer	LANTDIV

ITEMS DISCUSSED:

Issues

1. Reviewed new building footprint for concept #2 .
2. Site location for BEQ and associated parking.
3. Site location of parking related to future Mess Hall to be located east of the parking area for the BEQ.

Conclusions

1. Location of BEQ as shown in Concept #2 is acceptable.
2. Site relocation of parking area (298 vehicles) in relation to BEQ location is acceptable.
3. Location of BEQ parking area is east of relocated Jackson Street; can be expanded to accommodate future parking Mess Hall

MEETING MINUTES/ PHONE CONVERSATION RECORD

DATE: 07 December 1999
TIME: 1:00 – 2:00PM
LOCATION: (if meeting) Meeting Room, Comfort Inn
RE: Electrical and Phone/Data Design Criteria

ATTENDEES/PARTICIPANTS:

<u>Name</u>	<u>Function</u>	<u>Organization</u>
Andy Young	Electrical Engineer	PWC Camp Lejeune
Rick Stephens	Electrical Engineer	LANTDIV

ITEMS DISCUSSED:

1. Discussed Design Guidelines and Criteria for design at Camp Lejeune
2. Standards for telephone/data wiring at Camp Lejeune

MEETING MINUTES/ PHONE CONVERSATION RECORD

DATE: 09 December 1999
TIME: 9:00AM
LOCATION: (if meeting) Telecommunications Building, Camp Lejeune
RE: Telephone Service

ATTENDEES/PARTICIPANTS:

<u>Name</u>	<u>Function</u>	<u>Organization</u>
Rick Stephens	Electrical Engineer	LANTDIV
Ernie Gray	Base Telephone	PWC, Camp Lejeune

ITEMS DISCUSSED:

BEQ Contract will provide all wiring to outlets inside the building. Will also provide 25-pair cable from Core Area (Duty Office) to point-of-connection outside. Will provide empty conduit from main telephone distribution closet to composite handhold outside for installation of telephone cable by AT&T for service to rooms.

MEETING MINUTES/ PHONE CONVERSATION RECORD

DATE: 09 December 1999

TIME: 1:00PM

LOCATION: (if meeting)

RE: Cable TV Service

ATTENDEES/PARTICIPANTS:

<u>Name</u>	<u>Function</u>	<u>Organization</u>
Rick Stephens	Electrical Engineer	LANTDIV
William Diehl		Charter Communications

ITEMS DISCUSSED:

BEQ Contract will provide all wiring from main CATV service closet to all CATV outlets in building. Will also provide empty conduit from CATV service closet to composite/fiberglass handhole outside. Charter Communication will provide cable into building.

Civil Basis of Design
BACHELOR ENLISTED QUARTERS (P-159, FY01)
COURTHOUSE BAY, MCB CAMP LEJEUNE
Concept 3

1. EXISTING SITE DESCRIPTION

The site is located approximately 350 m west of Horn Road (Formerly Marine Road) and is bounded by Courthouse Bay on the west, Phipps Road to the south, Jackson Street to the north, and an existing concrete/earthen ditch adjacent to the new medical/dental clinic to the east. Jackson Street turns 90 degrees to run north/south and dissects the site. Several buildings formerly occupying the site have been removed, but most of the concrete slabs and sidewalks remain as well as several culverts with headwalls along Phipps Road. A good portion of this 4 hectare site is well maintained turf with a small area of scattered 300-600 mm predominantly pine trees adjacent to Jackson Street and a large area of scattered 300-750 mm predominantly pine trees along the periphery adjacent to Courthouse Bay. The area is well drained and several utility services remain active within the site including overhead electric power, a 200 mm water main, and 200 mm gravity sanitary sewer system. The paved surface of Jackson Street is in poor condition.

Existing Site Drainage

The site drains to the east and west from a ridge just east of Jackson Street. An existing small drainage system flows westerly to Courthouse Bay and an existing concrete/grassed ditch flows southerly toward a wooded area through an existing 750 mm culvert across Phipps Road.

Existing Water Main

An existing 200 mm water main parallels Jackson Street and ties to an existing 200 mm water main along Phipps Road. This line continues to serve several adjacent buildings in the area.

Existing Sanitary Sewer

An existing 200 mm gravity sanitary sewer runs along Phipps Road from the intersection with Jackson Street flowing to the east. Another 200 mm gravity sewer flows to the south to Phipps Road from Building BB49. These lines continue to serve adjacent buildings.

2. **CIVIL DESIGN**

Site Layout

The compactness of the building layout enables siting the structure to overlook adjacent Courthouse Bay. 298 parking spaces are placed at least 25 meters from the nearest building structure to provide minimum security clearance requirements for force protection. An area adjacent to the north and south side the BEQ will be set aside for resident's personal operational equipment rinsing and drying. Additional vehicle parking will be provided east of the relocated Jackson Street and can be modified to accommodate parking for future mess hall located east of the BEQ. The existing north/south segment of Jackson Street will be demolished as well as several training structures adjacent to building BB49. Jackson Street will move to the east to continue to provide area access from Horn Road to Phipps Road, and provides access necessary for fire protection equipment.

Utilities

Water Main

A new 200 mm water main will parallel the relocated Jackson Street with service lines extended to the new building as required for service and fire protection. Fire hydrant flow tests have been performed by LANTDIV Fire Protection rep and it has been determined that the system is adequate for domestic service and fire protection. The existing 200 mm water main along Jackson St. (running north/south) will be disconnected and removed.

Sanitary Sewer

A new sanitary lift station and force main are required to connect the new building to the existing 200 mm gravity sewer. The depth of the existing sewer is not adequate to extend the gravity sewer system to the new building.

Drainage

Underground storm system will be provided for roof drainage. The new storm water drainage system will drain to a new stormwater management pond that will discharge into Courthouse Bay. The storm water will be located so that it can be expanded to accommodate the runoff from the future mess hall located east of the BEQ parking area. This will provide the necessary site drainage as well as meet the requirements of the State of North Carolina Division of Environmental and Natural Resources (NCDENR) Division of Water Quality. Erosion and Sedimentation Control devices will also be provided to meet the NCDENR Division of Land Quality requirements.

Parking Requirements (Spaces):

Residents – 280

Visitors – 4

Handicap – 4

Staff – 10

Motorcycles – 20

Bicycles – 6

Personal Equipment Rinse/Dry Facilities:

A wash pad will be located adjacent to the north and south sides of the BEQ to rinse resident's personal operational equipment. Drying pads will be provided for drying the equipment. Drying pads will be enclosed by fencing with access gates. The wash pad will drain to a grit chamber and discharge will go to new sanitary sewer system.

Parking Area:

Additional landscaped curbed islands will be provided and an additional parking area access off relocated Jackson Street will be provided.

Trash Collection:

One trash collection pads will be located north of Phipps Road and south of BEQ and another trash collection pad will be located north of the BEQ and adjacent to the parking area.

Fire Protection:

An additional fire hydrant (total of 3) will be provided for BEQ fire protection.

Geotechnical Basis of Design
BACHELOR ENLISTED QUARTERS (P-159, FY01)
COURTHOUSE BAY, MCB CAMP LEJEUNE
Concept 3

1. FOUNDATION

The soil borings for this site are not complete at this time. Based on previous soil borings in the area, the building is anticipated to be supported on a timber pile foundation . The piles are expected to bear approximately 15 meters below the existing ground surface and have a capacity of approximately 250 kN. Improvement of the site beyond standard stripping and compaction of the subgrade is not anticipated. Fill in excess of 2.0 meters is not anticipated. The actual foundation type, capacity and the need for site improvement will depend on the results of the site soil borings.

2. PAVEMENT

The laboratory tests on soil sampled from the subgrade are not complete at this time. The following is a very rough estimate of the proposed pavement sections based on the soil type and consistency indicated in previous soil borings in the area.

- Pavement in areas trafficked almost exclusively by automobiles consists of a 50mm bituminous surface and 250mm aggregate base on a compacted subgrade.
- Pavement in areas frequented by trucks and busses consists of a 100mm bituminous surface and 300mm aggregate base on a compacted subgrade.
- Pavement in loading areas and dumpster pads will be 200mm portland cement concrete on a compacted subgrade. An aggregate work pad and drainage layer may or may not be used.

The above pavement sections may change after receipt of the laboratory soils tests.

Architectural Basis of Design
BACHELOR ENLISTED QUARTERS (P-159, FY01)
COURTHOUSE BAY, MCB CAMP LEJEUNE
Concept 3

1. BUILDING DESIGN

The unique Courthouse Bay site, with panoramic views of the water, requires particular attention to the siting of the facility. The primary goal of the building design is to meet all functional requirements while taking the maximum advantage of the waterfront property.

The new facility will be 8,500 SM (91, 493 GSF) comprised of two three-story buildings adjacent to a one-story "core" building. The three story buildings will house all "apartment" modules, laundry and vending facilities on each floor, and primary mechanical and electrical spaces. The core building will be handicap accessible and will house all public functions including a lounge, public restrooms, vending, minimal storage and office space. The building is planned to have an exterior face of standard size brick in a running bond with bands of soldier coursing as appropriate for minimal cost accent. The back-up will be concrete masonry units (CMU) or cast-in-place concrete bearing wall.

The apartment entry doors shall be insulated steel. Single hung bronze aluminum windows will be provided in the typical module. All glass will be insulated glazing with mylar film applied as a "force protection" measure.

Typical interior partitions will be CMU with epoxy paint finish.

The roof will be architectural shingles over an appropriate substrate and metal deck with steel trusses bearing on CMU walls and concrete slabs. The roof will slope to exterior gutters and downspouts.

Typical modules will include a sleeping/living area and a service area. The service area shall have two closets and a semi-private bathroom with a toilet and shower compartment. A small refrigerator space will be provided in the service area along with a sink. The microwave will be mounted to the underside of wall cabinets adjacent to the refrigerator.

2. HANDICAP ACCESSIBILITY

All apartment modules are "intended for use by able-bodied military personnel only." All public spaces will be accessible to the physically handicapped. Design will be in accordance with Uniform Federal Accessibility Standards (UFAS) and the Americans with Disabilities Act Accessibility Guidelines

(ADAAG). An accessible refrigerator and microwave will be located in the core building.

3. THERMAL INSULATION

Three areas are required to have thermal building insulation. The exterior walls will be insulated in conjunction with the masonry cavity wall and the roof will be insulated above the ceiling of the third floor concrete slab and above the ceiling of the "core" facility. Concrete slabs-on-grade will be insulated with perimeter insulation and a vapor barrier.

Thermal insulation values, in conjunction with other building materials, will be as selected to meet the required Energy Budget.

4. PRIMARY FINISHES

Interior colors and patterns will be incorporated into the walls and floors to enhance the moral and welfare of personnel. The core area's vestibule and lobby will be quarry tile with carpet inlays and upgraded wall treatment. Corridors will be carpeted and have a wall covering to a chair rail. Typical ceilings will be gypsum wallboard painted.

Within the core facility, the primary lounge/activity areas shall be carpeted. Vinyl composition floor tiles shall be used in the administrative area, vending, and housekeeping spaces and the public toilets shall receive ceramic tile. Mechanical, electrical, and janitor closets will be exposed concrete with sealer.

The apartment modules shall receive vinyl composition tile floors and resilient base in the sleeping/living areas, service areas and closets. The apartment bathrooms shall receive a ceramic tile floor and base along with a prefabricated shower enclosure. All cmu walls shall be primed and painted with a durable, epoxy paint.

5. NON-PERMANENT ITEMS

Furniture will be provided in the lounge and administrative spaces. Each sleeping/living area will include 2 beds, 2 night stands, 2 desks, 2 chairs, a refrigerator and a TV stand. Six separate laundry areas will be equipped with a total of one washer for every 10 residents and one dryer for every 6 residents. These items are collateral equipment and not funded in the construction contract.

6. ACOUSTICS

The laundry areas at the ends of each apartment wing are separated from the main building by the exterior walkway to minimize noise disturbances from

both the equipment and users. Mechanical equipment will be housed as to acoustically separate it from adjacent sleeping rooms (to the side and/or above).

7. DESIGN CRITERIA

MIL-HDBK-1190, 1 September 1987

MIL-HDBK-1036A, 6 August 1997

Uniform Federal Accessibility Standards (UFAS), Federal Standard 795, 28 March 1989

ADA Accessibility Guidelines (ADAAG), August, 1991

Landscape Architectural Basis of Design

BACHELOR ENLISTED QUARTERS (P-159, FY01)

COURTHOUSE BAY, MCB CAMP LEJEUNE

Concept 3

1. SITE DESCRIPTION

The site for the new BEQ offers a great opportunity to take advantage of existing views across Courthouse Bay. Efforts will be made to preserve large existing trees along the slopes of this site which lead down to the water's edge. Views to the bay will filter through these trees. A courtyard area (complete with benches, trash receptacles, barbecue grills, and precast concrete pavers) will be located on the west side of the BEQ adjacent to the core building lounge area. This layout will lend itself to maximizing open views across the bay. Any new plantings of trees along the river will serve to frame these views.

Only the hardiest plants will be used for landscaping. These plants will be drought, insect, and disease resistant. All planting beds will be designed to reduce pruning requirements as well. All beds will utilize polypropylene weed control fabric covered with a three inch layer of #3 tan river stone to help keep the beds as weed-free as possible. Additionally, planting beds will be enclosed on all sides by steel edging or concrete curbing to help keep grass out and maintenance low. All grass areas will be seeded with Centipede grass. This grass type is the most prevalent throughout Camp Lejeune and will hold up best for the site conditions.

Landscape design will be incorporated throughout the project site to provide the following benefits:

- Foundation plantings will be provided only at the main entrance to the core building to provide accent and beauty. All ground covers will be kept to a minimum to reduce maintenance requirements. These beds will be selected from a palate of plants that will not exceed a 6-inch height, in order to remain compliant with Force Protection standards.
- Screen plantings will be used to soften the impact of any objectionable views, utilities, and appurtenances.
- Tree plantings will be utilized to reduce negative effects created by parking lots. Trees will also be planted to strengthen Force Protection design by creating "Living Shields" from intruding vehicles.
- Sustainable landscape design will be used to the greatest extent possible. This will include the use of recycled plastic for benches and tables.
- Precast concrete pavers will be located for accent at the main entrance to the core building.

- The wetland marsh along the shore of Courthouse Bay will be preserved.
- The only recreation equipment to be provided will be physical fitness equipment (i.e., pull-up bars, sit-up ramps, etc) located at an open grass area on site.

2. **PLANT MATERIALS WILL BE SELECTED FROM THE FOLLOWING LIST:**

Large Shade Trees

Quercus virginiana (Live Oak)

Trees For Parking Lot

Quercus laurifolia (Laurel Oak)

Evergreen / Screen Trees

Ilex opaca (American Holly)

Myrica cerifera (Wax-myrtle)

Pinus taeda (Loblolly Pine)

Ornamental / Flowering Trees

Ilex opaca (American Holly)

Myrica cerifera (Wax-myrtle)

Lagerstroemia x 'Natchez' (Natchez Crape-myrtle)

Lagerstroemia x 'Muskogee' (Muskogee Crape-myrtle)

Lagerstroemia x 'Tuscarora' (Tuscarora Crape-myrtle)

Ground Cover for Planting (Within 30 Ft. of BEQ)

Juniperus conferta 'Blue Pacific'

Large Shrubs for Screening (Outside 30 Ft. of BEQ)

***Juniperus chinensis* 'Torulosa'**

Pittosporum tobira

Structural Basis of Design
BACHELOR ENLISTED QUARTERS (P-159, FY01)
COURTHOUSE BAY, MCB CAMP LEJEUNE
Concept 3

1. FOUNDATION

See Geotechnical Basis of Design.

2. TYPE OF CONSTRUCTION

For inhabited structures of three stories or more, use a moment resisting frame support system and design in structural redundancy that allows the loss of one primary vertical or one primary lateral load-carrying element without progressive collapse.

For all multistory inhabited structures, design all multistory vertical load carrying elements assuming loss of lateral support at any one floor level (i.e. a laterally unsupported length equal to two stories).

Structurally separate portions of inhabited structures with lesser occupancies from the inhabited portions of the structure when portions with lesser occupancies are located within prescribed standoff distances.

BEQ - Walls

All exterior walls and structural load-bearing walls shall be either 203 mm thick minimum vertically and horizontally reinforced concrete masonry or 203 mm thick minimum cast-in-place reinforced concrete. Wood or metal stud construction is not acceptable.

Exterior walls in inhabited structures will employ one-way wall elements spanning vertically to minimize blast loads on columns.

All remaining walls shall be minimum 152 mm thick vertically and horizontally reinforced concrete masonry or minimum 152 mm thick cast-in-place reinforced concrete. Wood or metal stud construction is not acceptable.

BEQ – Floors

The floor system, not including the attic slab, shall consist of either precast concrete planks or cast-in-place concrete. Slabs-on-grade, if allowed by the Geotechnical criteria, shall be cast-in-place concrete.

On multistory inhabited structures, run concrete floor slab reinforcement continuously through both faces of the slab and into the beams and columns to improve capability to withstand load reversals.

BEQ - Roof

Wood Construction is not allowed for any part of roof including roof framing, decking and sheathing. Roof deck shall be galvanized type, a minimum of 20-gauge thickness and 38.1 mm deep. Deck shall be welded to roof framing.

3. DESIGN CRITERIA

The structural design shall conform to the applicable requirements of the latest editions of the following manuals, codes and standards:

ICBO UBC
ASCE 7-95
SDI DDM
AISC M016
ACI 530-08
AISI-SG-673
TI 809-04
ACI 318

4. DESIGN LIVE LOADS

Roof	1.0 kPa
Living Quarters	2.0 kPa
Balconies, Stairs, and Lobbies	5.0 kPa
Recreational Areas	3.0 kPa
Mechanical Rooms	7.0 kN/sq. m.

Wind Peak Gust Velocity = 185 km/hr

Seismic Design:

Short Period Spectral Response Acceleration, $S_s = .225g$

Spectral Response Acceleration at On-Second Period, $S_1 = 0.1g$

Site Classification as determined by Soils Report

Mechanical Basis of Design
BACHELOR ENLISTED QUARTERS (P-159, FY01)
COURTHOUSE BAY, MCB CAMP LEJEUNE
Concept 3

1. PLUMBING SYSTEM

Design Criteria:

National Standard Plumbing Code, Latest Edition
NAVFAC DM-3.01 Sizing Hot Water System, May 1986
MIL-HDBK-1036A Bachelor Housing, August 1997

The BEQ will be serviced by a 150mm diameter water supply line. Two 200mm diameter sanitary waste pipes will collect waste from the north and south orientations of the building to a sanitary pump station. Base steam will be utilized for the generation of domestic hot water, which will be stored at 60° C and blended with cold water down to 43.3° C for distribution throughout the facility. A domestic hot water recirculation system will be utilized to ensure instant hot water to all fixtures. The approximate storage capacity for the domestic hot water tank will be 11400 liters.

2. MECHANICAL SYSTEMS

Design Criteria:

NAVFAC-DM 1003/3, Heating, Ventilating, Air Conditioning & Dehumidifying, November 1995
ASHRAE 62-99 Ventilation for Acceptable Indoor Air Quality
MIL-HDBK-1036A Bachelor Housing, August 1997
MIL-HDBK 1190 Policy Guidelines for Installation Planning, Design, Construction and Upkeep, September 1987
SMACNA HVAC Duct Construction Standards

The design air conditions are as follows:

<u>Winter (°C DB)</u>	<u>Summer (°C DB/°C WB)</u>	
Outside Air	-5.0°	32.2° / 26.1°
Sleeping Rooms	20.0°	24.4° / 17.8°
Lounges	20.0°	24.4° / 17.8°
Offices	20.0°	24.4° / 17.8°
Laundry	20.0°	24.4° / 17.8°
Toilets/Jan. closets	12.7°	---
Mech/Elect. Room	4.4°	---

Base Steam Utilization

Heating will be accomplished using hot water generated from the steam distribution system. The high-pressure (690 kPa) steam line will be extended underground from bldg. BB48 to a steam pit adjacent to the mechanical room. Incoming steam will be metered in the central mechanical room the.

Within the mechanical room the high-pressure steam (690 kPa) will be reduced to 100 kPa. The low-pressure steam will be converted to 82° C hot water for space heating. Steam condensate will be collected and returned to the condensate return system by a packaged steam powered condensate pumping unit. This unit shall include a vented receiver and duplex pumps; each pump will be sized to pump 150% of the maximum condensate generated using high-pressure steam (690 kPa) steam pressure. A steel pre-insulated pipe return will be utilized. The steam PRV station, domestic hot water heater, converter and condensate pumping equipment will be located in the mechanical room.

Ventilation

Outside air will be introduced into the sleeping rooms via the central VAV air-handling units at a rate of 14.2 L/s per room. The lounge and office areas will be ventilated at a rate of 10 L/s per person and 7 L/s per person, respectively, which will also be introduced by the central VAV air-handling units.

Toilets and janitor closets will be ventilated at a rate of 10 L/s/m².

The laundry room will be ventilated at 12 L/s per person based on 10 persons per 100 m². A plenum behind the dryers will be utilized to eliminate the requirement to heat room air for dryer intake air.

Cooling/Heating systems

Cooling will be provided in the sleeping rooms by series fan-powered VAV boxes. Central VAV air handling units will be utilized on each floor to satisfy the heating/cooling loads, including ventilation, for sleeping rooms, offices, and lounges.

The core area will utilize a dedicated VAV air handler serving non fan-powered VAV boxes.

A packaged air-cooled, reciprocating chiller, located in the mechanical yard will produce chilled water for the central VAV air conditioning units. The piping system will utilize primary/secondary pumping to ensure constant flow through the chiller.

VAV terminal units, whether fan-powered or not, provided with pressure independent volume regulators, and hot water terminal coils. Recirculation air to the fan-powered VAV boxes in each sleeping room will be through ceiling mounted filter/grilles.

The toilet rooms in the sleeping rooms will have a continuous exhausted via a central exhaust system.

3. CONTROL SYSTEM

Electronic and DDC controls will be provided for the HVAC control system. Pneumatic Controls will not be utilized.

4. ENERGY CONSERVATION

The design energy budget for a Facility Type Q in weather Region 8 is 445.5 MJ/m²/yr. The calculated energy budget will be calculated at a later date.

FACD HVAC System Alternatives Basis of Design

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1. SERIES FAN-POWERED VARIABLE AIR VOLUME (FPVAV) TERMINALS

Series fan-powered variable air volume (FPVAV) terminals with terminal hot water coils. Chilled and hot water coil equipped variable air volume (VAV) air handlers. Variable frequency drive fan modulation. Steam/hot water converter. Air-cooled chiller. Steam generated domestic hot water.

Advantages

- The psychrometric characteristics are excellent.
- Space loads are easily matched.
- Heating and cooling capability can be provided at all times, independent of the mode of operation of other spaces in the building.
- No summer to winter changeover requirements.
- Generally suited for close humidity control with Hot Water Coil at terminal.
- Condensate removal is only required at the VAV air handlers, not at the FPVAVs.
- FPVAVs provide individual space temperature control.

Disadvantages

- FPVAVs can be noisy, especially in medium and high fan speeds.
- FPVAVs mounted above ceilings are difficult to access for maintenance through ceiling access panels.
- VAV control system is more complicated than the alternative.
- VAV system is difficult to balance.
- VAV duct system is larger and more extensive than the other alternatives.
- Numerous recirculation air filters associated with FPVAVs

2. **PACKAGED TERMINAL HEAT PUMP (PTHP)**

Packaged terminal heat pump (PTHP) units with central chilled and hot water coil ventilation air handling units. Steam/hot water converter. Air-cooled chiller. Steam generated domestic hot water.

Advantages

- Low initial cost.
- PTHPs provide individual space temperature control.
- Heating and cooling capability can be provided at all times, independent of the mode of operation of other spaces in the building.
- Floor mounted PTHPs are easily accessed for maintenance.
- Slide-in chassis of the PTHPs permit easy removal and replacement.

Disadvantages

- PTHPs can be noisy.
- Limited performance options are available because airflow, cooling coil size and condenser sizes are fixed.
- Not generally suited for close humidity control
- Air distribution within the spaces is compromised.
- Increased number of compressors and air filters to service.
- Routine maintenance is required to maintain capacity. Coils must be cleaned and filters changed regularly.
- PTHP wall penetrations are avenues for infiltration and leakage by wind driven rain.
- PTHPs take up some floor area of already confined spaces.
- PTHPs are subject to occupant tampering and abuse.
- An extensive condensate removal system will require periodic cleaning.
- PTHPs are exposed to corrosive effects of weather.

Electrical Basis of Design
BACHELOR ENLISTED QUARTERS (P-159, FY01)
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Concept 3

1. INTERIOR DISTRIBUTION SYSTEMS:

Electrical characteristics:

208Y/120 volt, 3 phase, 4 wire, and 60-hertz secondary.

Estimated Load Breakdown:

Electrical Load	Conn. (kva)	Demand Factor	Demand (kva)
Bldg. Lighting		1.0	
Receptacle		0.7	
Mech. Eq.		0.8	
Misc. Eq.		0.8	
TOTAL			

Type of Wiring System:

Main Service: Rigid galvanized steel conduit, above ground. Concrete encased PVC ductbank below ground to a pad-mounted transformer.

Branch Circuits:

Intermediate Metal, Electrical Metallic Tubing or Rigid Galvanized Steel conduit in buildings. Concrete encased PVC ductbank below grade.

Type of Conductors:

All 600 V power conductors to be copper, with 75 degree C. THWN or XHHW insulation, except conductors for lighting fixtures shall be rated 90 degree C. as required.

Design Standards:

Voltage Drop: Limited to 5% total.

Main Feeder runs less than 2% voltage drop.

Branch Circuit runs less than 3% voltage drop.

Lighting Standards:

Lighting Levels will be in accordance with Mil Handbook 1190. Fluorescent lighting fixtures shall provide general illumination in personnel, administrative, laundry and mechanical areas. Exterior area lighting shall be provided by high-pressure sodium lighting fixtures. Energy conservation will consist of photocell control of exterior light fixtures and selective local switching of interior light fixtures. Occupancy sensor switches will control light fixtures in lounges, mechanical/electrical spaces, public restrooms and laundry rooms.

Specialty Systems:

Cable Television Systems (CATV): Local cable television service provider will provide exterior cable television connection. Interior cable television will consist of coaxial cable in ¾" conduit to two cable television outlets per room.

Closed Circuit Television Systems (CCTV): Not required.

Intercom: Not required.

Paging System: Not required

Signal System: Not required.

Lightning Protection System: Not required.

Grounding Systems: Not required

400 Hertz system: Not required

Intrusion Detection System: Not Required.

Emergency Power System: Not Required.

Telecommunication Systems.

Telephone System: Local Exchange Carrier (LEC) will provide Exterior Telephone connection. Interior Telephone system will consist of a Main distribution board with Category 5 cable in a minimum of ¾" conduits to four RJ45 outlets per room.

2. EXTERIOR DISTRIBUTION SYSTEM:

Electrical characteristics: Existing exterior overhead primary circuit will be extended overhead to Bachelor Enlisted Quarters site where it will then be run underground to the service pad-mounted transformer.

3. OUTLINE SPECIFICATIONS:

16050 Basic Electrical Materials and Methods

This section applies to all sections of Division 16, ELECTRICAL, except as specified otherwise.

- 16272 Three-phase Pad-mounted Transformers
Provide three-phase pad-mounted transformer, dead-front type, for electrical service to building.
- 16301 Overhead Transmission and Distribution
Provide materials and equipment for construction of overhead primary distribution system.
- 16303 Underground Electrical Work
Provide underground service conductors into buildings. Provide connections into existing systems. Perform excavating, backfilling and other incidental work as required.
- 16402 Interior Distribution Systems
Electrical wiring of equipment and service outlets. Provide panelboard, receptacles, circuit breakers, switch, conduit, wiring, boxes and all other items associated with the interior electrical systems.
- 16510 Interior Lighting
Provide lighting fixtures, cables, wire, conduit, reflectors, junction boxes, controls, switches, contacts and all other items associated with this system.
- 16520 Exterior Lighting
Provide fixtures, supports, controls and all other incidental work for a complete system.
- 16710 Structured Telecommunications Cabling and Pathway System
Structured Telecommunications Cabling System shall consist of a main distribution frame with category 5 cabling and supporting conduit system with Cat 5 outlets as required.

Fire Protection Basis of Design
BACHELOR ENLISTED QUARTERS (P-159, FY01)
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Concept 3

1. GENERAL DESCRIPTION / ASSUMPTIONS

3 story BEQ, foot print of approximately 8,500 square meters (91,500 square feet), fully sprinklered building, assume separation on 4 sides in excess of 12.2 meters (40 feet). Both NFPA 101 and UBC are utilized, as applicable, in accordance with the requirements of MIL-HDBK-1008C. See UBC Analysis for permitted construction type.

2. CRITERIA

NFPA 101 <i>Life Safety Code</i>	1997 Edition
ICBO <i>Uniform Building Code (UBC)</i>	1997 Edition
MIL-HDBK-1008C <i>Fire Protection for Facilities Engineering, Design, and Construction</i>	10 June 1997
MIL-HDBK-1036A <i>Bachelor Housing</i>	06 August 1997

Additional NFPA Codes and Standards:

NFPA 1, Fire Prevention Code
1997 edition

NFPA 13, Standard for the Installation of Sprinkler Systems
1999 Edition

NFPA 20, Standard for the Installation of Centrifugal Fire Pumps
1999 Edition

NFPA 72, National Fire Alarm Code
1999 Edition

NFPA 82, Standard for the Installation of Incinerators, Waste, and Linen Handling Systems and Equipment
1999 Edition

NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems 1999 Edition

3 LIFE SAFETY AND CONSTRUCTION TYPE REQUIREMENTS

Occupancy Separation Requirements:

Minimum Area/Occupancy Separation Requirements: More stringent requirements may apply based on other factors.

- 1-hour from potential Group A, B and M Occupancies, no other types are anticipated (UBC Table 3-B)
- 1-hour wall and floor/ceiling separation between units. (UBC 310.2.2)
- 1-hour wall and floor/ceiling separation for laundry rooms and mechanical rooms (NFPA 101 Table 18-3.2.1) *Assumes laundry rooms > 9.23 sq. meters (100 square feet) & central HVAC system with fuel-fired heaters.*

- 1-hour wall and floor/ceiling separation for trash rooms (NFPA 101 Table 18-3.2.1)
- 1-hour interior corridors w/ 20-min doors. (NFPA 101 §18-3.6.2)

Construction Type, Area Limitations and other applicable UBC requirements (NFPA 101 & other MIL-HDBK requirements where noted):

		Construction Type
Fire Resistive Requirements by Building Element type		Type II 1 Hour
Exterior Walls: Bearing	Table 5-A	1-Hour Construction
Exterior Walls: Non-Bearing @ < 12.2 meters (40-ft) separation ≥ 12.2 meters (40-ft) separation	Table 5-A	1-Hour Construction NR, N/C Construction
Interior Bearing Walls:	Table 6-A	1-Hour Construction
Permanent Partitions:	Table 6-A	1-Hour Construction
Roofs and Roof-Ceilings	Table 6-A	1-Hour Construction
Floors and Floor-Ceilings	Table 6-A	1-Hour Construction
Exterior Openings @ ≥ 12.2 meters (40-ft) separation (MIL-HDBK-1036A)	Table 5-A	None Required
Shaft Enclosures	Table 6-A	1-Hour Construction
Stairway Construction	NFPA 101	1-Hour Construction with 60-Min Fire Doors

Exiting and Egress Requirements of NFPA 101

Minimum Egress Requirements:

Occupant Load: one person per 18.6-sq. meters (200 sq ft) (§18-1.7)
Area 2,833.3 sq. meters (30,500 sq. ft.)
Number of Persons 153
Number of Exits Minimum of 2

Stair Width:

Number of People 153
Egress Capacity 0.8 cm (0.3 in)/person (§5-3.3.1)
Stair Width Req.'s Yields 122 cm (48.1 in),
 Minimum 112 cm (44 in) per Table 5-2.2.2.1(a)

Stair Width: 122 cm
Corridor/Ramp Width:
 Number of People 153
 Egress Capacity 0.5 cm (0.2 in)/person (§5-3.3.1)
 Corridor Width Req.'s Yields 77 cm (30.3 in),
 Minimum 112 cm (44 in) per §18-2.3.3
 Minimum 1600 mm (63 in) (per MIL-HDBK-1036A §3.8.9
 Corridor Width: 1600 mm

Common Path of Travel:

With fire sprinklers, maximum 15 meters (50 ft). Travel within dwelling units not included. (§18-2.5.2)
 Dead-end Corridors: Maximum 15 meters (50 ft). (§18-2.5.3)
 Travel Distance: Within a dwelling unit, with fire sprinklers: Maximum 38 meters (125 ft)
 From dwelling unit, with fire sprinklers: Maximum 60 meters (200 ft) travel from entrance door of dwelling unit to nearest exit. (§18-2.6.2)
 From areas other than a dwelling unit: Maximum 83 meters (250 ft). (§18-2.6.3)

4. **AUTOMATIC AND MANUAL FIRE SUPPRESSION SYSTEMS**

Water Supply Data

Water supply data is based on water flow tests conducted on 07 December 1999.
 Static: 41-psi
 Residual: 20-psi flowing 1,737 gpm

Automatic Fire Sprinkler system

The building shall be protected throughout by automatic sprinklers in full accordance with MIL-HDBK-1008C and the 1996 Edition of NFPA 13 *Standard for the Installation of Sprinkler Systems*. The sprinkler system shall be hydraulically calculated. Note; it is NFPA 13 not NFPA 13R. The system shall utilize quick response sprinklers. Dwelling units shall be defined as Light Hazard Occupancies. All other areas are anticipated to be Ordinary Hazard Group I Occupancies. Provided the attic can be defined as "unused" and "inaccessible", there will be no need for sprinklers in the attic space.

Sprinkler System Design Criteria:

Occupancy Classification:	Light Hazard	Ordinary Hazard Group I
Design Area:	278.7 m ² (3,000 sq ft)	278.7 m ² (3,000 sq ft)
Design Density:	4.1 L/MIN /m ² (0.10 gpm/sq ft)	6.1 L/MIN / m ² (0.15 gpm/sq ft)
Hose Stream:	946.4 L/MIN (250 gpm)	1892.7 L/MIN (500 gpm)

Estimated Sprinkler System Demand:

982 gpm @ 60-psi

Standpipe System:

The installation of a standpipe system is **not** required per MIL-HDBK-1008C, nor NFPA 101.

Fire Pump:

Based on the flow tests conducted on 07 December 1999, the installation of a fire pump will be required for this project. It is estimated that a 500-gpm fire pump with a rated pressure of 30-psi will be sufficient for this project. The Design Build A-E will have the option of revising the rating of the fire pump as the actual design of the fire suppression system may result in a need for a "smaller" fire pump. The fire pump including driver, jockey pump, controllers, backflow preventer and piping associated with the fire pump is expected to need a foot print of approximately 6.1 meters x 3 meters (20 ft x 10 ft). This area is an approximation and most likely can be reduced by the Design Build A-E provided the design fully complies with the requirements and recommended practices of NFPA 20.

Fire Hydrants:

Location, type, spacing, etc. of fire hydrants shall comply with MIL-HDBK-1008C §5.73.

Fire Hydrants shall be the dry-barrel type.

Hydrants shall be located adjacent to paved areas, not closer than 1 meter (3 feet) but less than 2 meters (7 ft)

Spacing and number of hydrants shall be such that all parts of the exterior can be reached by hose lays of less than 110 meters (350 ft). Measured distances shall include consideration for all obstructions and accessibility. At least one fire hydrant shall be located within 45.7 meters (150 ft) of the fire department connection.

5. INTERIOR FIRE ALARM SYSTEM

Fire Alarm Panel (FACP)

Based on the size of the building, it is recommend that an addressable FACP be utilized. It is recommended that the FACP be located in the lobby.

Alarm and Supervisory Alarm Initiating Devices

The fire alarm system will include the following devices:

- Flow switches on each floor.
- Tamper switches will be required on all control valves controlling the fire sprinkler system, including; floor control valves, valves associated with the fire pump, the post-indicator valve, etc.
- As requested by base personnel, tamper switches shall be tied directly to the fire alarm transmitter with no connections to the building fire alarm panel.
- Manual pull stations at all exit doors, at the entrances to stairwells and other locations where required by NFPA 101.
- If needed, duct mounted smoke detectors.
- Provide smoke detectors at the FACP and at any sub-panels including supplementary panels utilized to power alarm notification appliance circuits.
- Heat detectors shall be provided in the attic space.
- Single station smoke detectors shall be provided in the dwelling units. These devices shall only sound alarms within the dwelling unit. These devices shall have no connection to the building fire alarm system.
- Supervisory alarms for monitoring fire pump run, loss of phase and phase reversal. Additional supervisory alarms may be required.

Alarm Notification Appliances

- Combination horn-strobes will be provided in hallways, laundry rooms and other public areas.
- Strobes will be provided in public restrooms.
- Mini-horns will be provided in all dwelling units.
- Exterior mounted appliances shall be weather proof.

Alarm Reporting

The Marine Corps Base Camp Lejeune utilizes both KingFisher and Seaboard radio fire alarm transmitters.

6. ANTICIPATED FIRE PROTECTION SPECIFICATION SECTIONS

- | | |
|-------|--|
| 13855 | Addressable Interior Fire Detection and Alarm System |
| 13920 | Fire Pumps |
| 13930 | Wet-Pipe Fire Suppression Sprinklers |

UBC ANALYSIS: Type V, 1-Hour Construction

Given a Building as Follows:

Analysis is based on the entire BEQ being considered as "one" building. Additional options and/or construction types **might** be available **if** fire rated area separation walls are utilized.

Occupancy Classification [Chapter 3]: R-1

Construction Type [Chapter 6]: Type V, 1-Hour

Number of Stories Permitted [Table 5-B]: 3
Automatic Sprinklers Increase?: Yes (No) 3

Area per Floor [Table 5-B]: 10,500

Separation Distances: 2 sides 3 Sides 4 Sides

North:	<u>+ 40</u>
South:	<u>+ 40</u>
East:	<u>+ 40</u>
West:	<u>+ 40</u>

Automatic Sprinklers?: Yes

Automatic Sprinklers Used for: X Allowable Area Increase [505]
 ~~Maximum Height of Building Increase [506]~~
 ~~Fire Resistive Substitution [Sec 508]~~

Is Building Within the Allowable Area?:

Number of Floors?: 3

Basic Allowable Area [Table 5-B]: 10,500

Multi-Story Increase [Sec 504.2]: x 2

Subtotal: 21,000

Separation Increases: 100 %

Subtotal: 42,000

Sprinkler Increase: 84,000

Total Allowable: 84,000 Single Floor 42,000

Total Actual: » 91,500 Largest Single Floor Actual » 30,500

TYPE V 1-HR CONSTRUCTION IS NOT PERMITTED.

UBC ANALYSIS: Type II 1-Hour Construction

Given a Building as Follows:

Analysis is based on the entire BEQ being considered as "one" building. Additional options and/or construction types might be available if fire rated area separation walls are utilized.

Occupancy Classification [Chapter 3]: R-1

Construction Type [Chapter 6]: Type II, 1-Hour

Number of Stories Permitted [Table 5-B]: 4
Automatic Sprinklers Increase?: Yes No 3

Area per Floor [Table 5-B]: 13,500

Separation Distances:	2 sides	3 Sides	4 Sides
North:	<u>+ 40</u>		
South:	<u>+ 40</u>		
East:	<u>+ 40</u>		
West:	<u>+ 40</u>		

Automatic Sprinklers?: Yes

Automatic Sprinklers Used for: X Allowable Area Increase [505]
 Maximum Height of Building Increase [506]
 Fire Resistive Substitution [Sec 508]

Is Building Within the Allowable Area?:

Number of Floors?: 3

Basic Allowable Area [Table 5-B]: 13,500

Multi-Story Increase [Sec 504.2]: x 2

Subtotal: 27,000

Separation Increases: 100 %

Subtotal: 54,000

Sprinkler Increase: 108,000

Total Allowable: 108,000 Single Floor 54,000

Total Actual: » 91,500 Largest Single Floor Actual » 30,500

TYPE II 1-HR CONSTRUCTION PERMITTED.

Specifications Basis of Design
BACHELOR ENLISTED QUARTERS (P-159, FY01)
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Note: DIVISIONS 02-16 Technical Specification Sections will be utilized
as required to support project criteria.

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